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NOTICE TO SUBSCRIBERS

Retroactive Pricing Rescinded

The new Standard Pricing Schedule announced in the August 20, 1964, issue of this publication is intended to eliminate dual pricing, and to provide a uniform, stable basis for the purchase of reports -- with an overall price reduction of about one-third. The retroactive feature of the announcement, however, has resulted in delays, excessive correspondence, and confusion in filing orders for reports. Therefore, in the interest of improving service, retroactive pricing is being cancelled. Accordingly, the earlier announcement is revised as follows:

1. All reports available through the Clearinghouse will be sold at the individual prices announced in U. S. Government Research Reports since July 1, 1961.
2. Reports announced in issues prior to July 1, 1961, will continue to be available at a cost of photo-reproduction from the Library of Congress, Photoduplication Service Section.

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Pricing schedules for sale of magnetic (computer) tapes, new journals, catalog cards, fee literature searches, and other bibliographic materials will be announced later.

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Department of Defense and certain other agencies of the Federal Government sponsoring research and development programs. Unless otherwise indicated, reports listed are available from the Office of Technical Services. The documents are available in original, reproduced, or microfiche copy only.

The first section of U. S. Government Research Reports (USGRR) is prepared for the Defense Documentation Center and is called "Technical Abstract Bulletin" (TAB). (DDC is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of civilian agencies of the Government and military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

Atomic Energy Commission reports available from OTS are listed in Nuclear Science Abstracts. NSA is available to the general public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $30 a year (domestic), $37 a year (foreign). Single copy cost, $1.75 (plus 25 percent for foreign mailing).

National Aeronautics and Space Administration reports available from OTS are listed in Scientific and Technical Aerospace Reports. STAR is available to the general public on subscription from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $25 a year (domestic), $31 a year (foreign). Single copy, $1.50 (plus 25 cents for foreign mailing).

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Almost all reports listed in USGRR are available from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230, or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Hard copy price is indicated by the letters "HC"; microfiche price is indicated by the letters "MF." Please use the identification numbers (AD number, PB number) and titles of reports when ordering. Also use accession numbers when ordering documents listed in NSA and STAR. Prepayment is required or purchases can be charged to Superintendent of Documents deposit accounts.

For reports available from GPO only, address your order and make check or money order payable to Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.

When any report is available from a source other than OTS or GPO, the name and address of that source will be given. Direct your order to that address and not to OTS.

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NOTICE TO SUBSCRIBERS ABOUT RECENT OTS CHANGES

Recent developments aimed at strengthening and broadening the OTS program, under Public Law 776 - 81st. Congress, for the collection and distribution of Government research and development reports will result in some important changes directly affecting OTS customers. Changes just made include document prices and method of microphotography. In the future, changes in the price of literature searching and in the composition of the USGRR, and possibly other changes, will be made and announced.

An interagency agreement, announced by the White House on February 28, called upon the Department of Commerce to strengthen and broaden the functions of OTS under Public Law 776 to make the agency more effectively a "Clearinghouse for Federal Scientific and Technical Information."

Steps to develop such a Clearinghouse are being taken as rapidly as possible, and the Office of Technical Services has been extensively reorganized to effectively carry out the expanded functions.

The Clearinghouse provides a single point of contact through which current research efforts and the results of Government-sponsored research in science and technology can be made available to industry, commerce, and the general public. The Clearinghouse collects, organizes, publicizes, and provides reference, referral, and sales services for technical reports and translations received from domestic and foreign sources. The primary aim of the Clearinghouse is to achieve through interagency agreement and cooperation a unified documentation and distribution system for Government-generated technical reports and information on research in progress.

Another significant development, in line with the interagency agreement, was the signing on March 9 of an agreement between the Department of Commerce and the Department of Defense providing for OTS to handle all processing and distribution of unclassified/unlimited DOD reports, a function formerly performed largely by the Defense Documentation Center, except that OTS was responsible for announcement, reproduction, and sale of these documents to the public.

Prices

OTS has always been required by Public Law 776 to operate its reproduction and distribution program on a self-supporting basis. For some time, OTS has had one price for printed documents and another for documents reproduced by "blow-back" from microfilm. In order to establish a single pricing schedule, and one which will return costs of reproduction and handling, the agency has established a new price for all original or reproduced documents which on the average are 1/3 lower than the previous pricing schedule, as shown by the following table.

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101 - 150	7.0	2.50	11.00	6.75	4.00
151 - 200	5.5	3.00	13.50	8.25	5.00
201 - 300	4.8	3.50	18.50	11.00	6.00
301 - 400	1.2	5.00	21.00	13.00	7.00
401 - plus	2.2	6.00 plus	22.75 plus	14.38 plus	7.00 plus .01/page in excess of 400 pages

Scientific satellites require electrical energy to operate a variety of instruments but probably not over something like 100 watts. For trips to the planets, electrical power will likely also be utilized in a thrust system. Examples include ionic propulsion, electrical arc heating of a gas, etc. These will require megawatts of power, particularly for high specific impulse systems. In addition each human occupant may require several kilowatts of electrical energy. For the satellite case power supplies of limited life may be satisfactory; for manned space flight only solar or nuclear sources can be considered. This paper outlines several possibilities, their present limitations and future potential. (Author)

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. government agencies and provides reference, interlibrary loan, and reproduction services.

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New York, N. Y. 10027

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Southern Methodist University
Science Library
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Dallas, Tex. 75222

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
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CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research Reports are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
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	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Descriptors: (*Photochathodes, Gold), (*Photosensitivity, Phototubes), Metal films, Composite materials, Fatigue (Mechanics), Cesium alloys, Silver alloys, Oxygen, Cathodes (Electron tubes), Photoelectric effect, Light, Sensitivity, USSR, Intermetallic compounds, Cesium, Silver, Gold alloys, Films.

Descriptions are given of Au-O-Cs and Au-Ag-O-Cs photocathodes produced on the basis of gold films without the use of a glow discharge in oxygen. Some characteristics of photocells containing such cathodes are reported and discussed. (Author)

AD-606 188 Div. 8
OTS Prices: HC $1.00/MF $0.50

Ionospheric Research Lab., Boston Coll., Chestnut Hill, Mass.
DETERMINATION OF THE IMPEDANCE OF AN ANTENNA FROM SLOTTED LINE MEASUREMENTS, ACCOUNT TAKEN OF THE ATTENUATION OF THE LINE.
Final and Scientific rept no. 2,
by Rene J. Marcou and Richard W. Doherty. 15 May 64, 16p
Contract AF19 604 7304, Proj. 8653, Task 865302
AFCRL 64 682
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electrical impedance, Antennas), (*Antenna simulators, Electrical impedance), Mathematical analysis, Transmission lines, Dummy loads, Electrical properties, Attenuation, Equations.

A method for determining the electrical degree distances between tap points on a slotted line with the attenuation of the line taken into account is developed. Formulas are also developed, taking into account the attenuation of the line, for the determination of the parameters used in the calculation of the impedance of a given load. An analysis using the voltage values at three tap points on the line is developed for the parameters V sub 1, V sub 2, their variations and for the impedance. A separate analysis using the voltage values at six tap points is developed for the variation. (Author)

AD-606 189 Div. 8
OTS Prices: HC $6.00/MF $1.25

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
IMPEDANCE AND RADIATION CHARACTERISTICS OF A FERRITE OBSTACLE IN THE APERTURE OF A RECTANGULAR WAVEGUIDE.
Doctor's thesis,
by J. C. Palais. Aug 64, 218p ORA-TR-146, ORA-06137-3-T
Contract DA36 039AMC03733E, Proj. 1G031101A042
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ferrites, Antennas), (*Antennas, Ferrites), Electrical impedance, Antenna radiation patterns, Waveguides, Antenna components, Magnetic properties, Cylindrical bodies, Scanning, Mathematical analysis, Airborne, Mobile, Slot antennas, X band.

A theoretical and experimental investigation is made of a magnetized ferrite obstacle in a rectangular waveguide having an additional discontinuity. The analysis is performed on right cylindrical obstacles (not necessarily circular) together with discontinuities that excite little or no field variations along the cylinder axis. The axis of the obstacle is parallel to the electric field corresponding to the TE sub 10 mode of the rectangular waveguide. The main application of the study is to the case where the discontinuity is an aperture (i.e., the waveguide radiates into free space) and the ferrite obstacle is placed directly in the aperture. This composite antenna structure is shown to be capable of being electronically scanned. The direction of the radiated beam is controlled by the magnitude of the applied magnetic bias field. Scanning over a total range of 60 degrees with good efficiency and reflection characteristics is obtained experimentally at frequencies around 10 Gc/sec. The applied magnetizing fields are less than 300 oersteds for this range of scanning. The antenna has the novel property of being nonreciprocal, the receiving and transmitting beam patterns are mirror images of each other. This is a new antenna and is one of only a few existing types of single element, electronic scanning devices. The small size and weight make it suitable for airborne and mobile equipment. (Author)

AD-606 191 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Silicon Transistor Corp., Long Island, N. Y.
PRODUCTION ENGINEERING MEASURE TO INCREASE THE RELIABILITY OF THE TRANSISTOR TYPE 2N2034.
Quarterly progress rept. no. 4, 1 Apr-30 Jun 64,
by J. Cocking, J. Courier, F. Des Roches, D. Hughes, and E. Martin. 30 Jun 64, 29p
Contract DA36 039AMC01482E
Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), Processing, Disks, Silicon, Cleaning, Abrasive blasting, Soldering, Chemical milling, Encapsulation, Welding, Hermetic seals, Tests, Controlled atmospheres, Performance (Engineering), Nickel, Pellets.

The report describes the processing developments in wafer cleaning, mesa delineation, scribing of water, pellet to nickel-plated header soldering, nickel-plated clip to pellet soldering, final etch of soldered unit, final test and encapsulation of etched units, and weld and hermetic seal tests for the transistor type 2N2034. (Author)

AD-606 222 Div. 8
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
A LOW 'JITTER' VARIABLE TIME DELAY UNIT,
by Vernal Josephson. 11 Feb 59, 13p
STL-TR-59-0000-00593
Contract AF04 647 309
Unclassified report

Descriptors: (*Delay circuits, Design), Timing circuits, Oscillators, Operation, Wiring diagrams.

A single pulse variable time delay circuit has been developed which will produce pulses which can be varied in time from 5 microsec to 100 microsec with pulse to pulse variation of < 0.1 microsec over the delay range. Circuitry details and limitations are discussed. (Author)

AD-606 235 Div. 8
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
TANTALUM CAPACITORS. A PRELIMINARY SURVEY OF THE LITERATURE,

8. Electronics and Electronic Equipment

AD-606 164 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
FATIGUE OF ANTIMONY-CESIUM PHOTOCATHODES,
by N. S. Khlebnikov and P. A. Sinitsyn. 1964, 8p
AERDL T1727; TT 64 71449

Unclassified report

Trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1940, v. 10, no. 22, p. 1913-1918.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Photocathodes, Fatigue (Mechanics), Antimony, Cesium, Sensitivity, Photoelectric effect, Photoconductivity.

The article describes experiments showing that antimony-cesium vacuum photocathodes display, in addition to high integral sensitivity, extremely low fatigue under the conditions characteristic of prolonged operation (for example, in sound films); the variations in spectral response occurring as a result of fatiguing are described, and a new parameter is proposed permitting comparison of phototubes with respect to fatigue. (Author)

AD-606 165 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
NEW OXYGEN-SILVER-CESIUM PHOTOCATHODES,
by N. S. Khlebnikov and P. A. Sinitsyn. 1964, 8p
AERDL T1728; TT 64 71451

Unclassified report

Trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1940, v. 10, no. 22, p. 1919-1923.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photocathodes, Design), Oxygen, Silver, Cesium, Sensitivity, Thermionic emission, Photoconductivity, Fatigue (Mechanics), Spectra (Infrared), Vapor plating, Photoelectric effect, Phototubes.

The (Ag-O-Cs)-Ag photocathodes described in this article differ from ordinary (Ag-O-Cs) cathodes in spectral response, in the noticeable shift of the infrared peak toward the ultraviolet, in higher sensitivity in the 6000-4000 A region, and in very slight fatiguing with high integral sensitivity. The combination of high sensitivity and absence of fatigue makes it possible to substitue the new phototubes for oxygen-silver-cesium gas tubes even where they cannot be replaced by antimony-cesium phototubes owing to the nature of the spectral response of the latter types (absence of sensitivity in the infrared portion of the spectrum). Thus, if further tests confirm available data indicating slight fatiguing of these cathodes, it may be assumed that in addition to nonfatiguing cathodes for the visible region (antimony-cesium), there also can be stable cathodes for the near infrared region.

AD-606 167 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
EFFICIENCY OF LIGHT UTILIZATION IN ANTIMONY-CESIUM PHOTOCATHODE FILMS,
by P. G. Borzyak, B. I. Dyatlovitskaya, and T. N. Chernysheva. 1964, 10p
AERDL T1745; TT 64 71448

Unclassified report

Trans. of Radiotekhnika i Elektronika (USSR) 1956, v. 1, no. 3, p. 370-376.

Descriptors: (*Photocathodes, Photoelectric effect), (*Photoelectric effect, Photocathodes), Photoelectrons, Thickness, Metal films, Antimony alloys, Cesium alloys, Light, Absorption, USSR.

On the basis of the values of the optical constants and photoelectron escape depth calculated previously for Cs3SB, computations are presented for the light absorption in cathodes of various possible phototube systems, and conclusions are drawn as to their efficiency. The results of some of the calculations are verified experimentally.

AD-606 168 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
A STUDY OF FATIGUE IN SILVER-OXYGEN-CESIUM PHOTOCATHODES,
by P. G. Borzyak, V. F. Bibik, and G. S. Kramarenko. 1964, 16p
AERDL T1746; TT 64 71450

Unclassified report

Trans. of Radiotekhnika i Elektronika (USSR) 1956, v. 1, no. 3, p. 358-369.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photocathodes, Fatigue (Mechanics)), (*Photosensitivity, Phototubes), Ionization, Adsorption, Surface properties, Experimental data, Volume, Silver alloys, Cesium alloys, Oxygen, Light, Cathodes (Electron tubes), Sensitivity, USSR, Films, Silver, Cesium, Illumination.

The article gives experimental results on fatigue of silver-oxygen-cesium photocathodes that do not correspond to existing ideas as to the nature of this phenomenon. There are indications that a major role is played here by volume changes in the oxygen-cesium films due to the effect of illumination. (Author)

AD-606 170 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
COMPOSITE PHOTOCATHODES BASED ON GOLD,
by P. G. Borzyak. 1964, 10p
AERDL T1747; TT 64 71447

Unclassified report

Trans. of Akademiya Nauk URSR, Kiev. Instytut Fizyky. Trudy, 1956, v. 7, p. 35-43.

Ships for this change. In spite of delays in obtaining the masks for the silicon transistor, it was possible to ship 50 the 100 final devices on the contractual due date and the remaining 50 the following month. (Author)

AD-606 319 Div. 8, 6
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
INTERPRETATION AND COMPARISON OF OUTPUT SIGNALS FROM LINEAR-FM PULSE-COMPRESSION SYSTEMS,
by M. H. Ueberschaer. Aug 64, 58p TM-03984
Contract AF19 628 2390, Proj. 750
ESD TDR64 129
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Pulse compression, Linear systems), (*Signals, Radar tracking), Radar targets, Frequency modulation, Doppler effect, Feasibility studies, Electronics.

Several expressions for the output time function of a linear-FM pulse-compression filter, which have recently been derived, (ESD-TDR-64-128) are compared and interpreted. Comparisons are made analytically as well as graphically with respect to several pertinent parameters. It is shown that if the phase and envelope measurements of signals returned from an actual target were to be interpreted as though the signal had undergone a Doppler shift (instead of a time dilation), a considerable error would result for high target velocities. The feasibility of using an all-pulse-compression system for obtaining accurate estimates of radar target parameters is demonstrated. Simple analytic expressions, which describe the phase and envelope quite well during the time of measurement, are presented, and a procedure for properly interpreting the data is indicated. (Author)

AD-606 321 Div. 8
OTS Prices: HC $1.00/MF $0.50

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF PPM-FOCUSED LOW-NOISE TRAVELING-WAVE TUBES FOR K sub u-, K-, AND K sub a-BAND.
Interim development rept. no. 4, 1 Apr-30 Jun 64.
Sep 64, 24p
Contract NObsr89323, Proj. SR0080304, Task 9293
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Traveling-wave tubes, K band), (*Microwave amplifiers, Traveling-wave tubes), Magnets, Focusing, Noise (Radio), Broadband, Design, Performance (Engineering).

Achievement of 11 db maximum broadband noise figure for K sub u-band tube covering frequency range of 10.5 to 16.5 Gc was obtained in PPM stack. Two prototype PPM stack and packages were constructed. PPM stack and compact package design concepts used in K sub u- and K-band tubes were applied to the design of K sub a-band tube stack and package. (Author)

AD-606 324 Div. 8, 26
OTS Prices: HC $6.00/MF $1.50

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Final rept. for 1 May 61-30 Jun 64,
by D. L. Cook. 30 Jun 64, 276p
Contract DA36 039sc85953
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Triodes, Manufacturing methods), Specifications, Ultrahigh frequency, Electron tubes, Ceramic materials, Seals (Stoppers), Anodes (Electron tube), Cathodes (Electron tube), Coatings, Performance (Engineering), Temperature, Humidity, Tests, Life expectancy, Failure (Mechanics), Quality control, Electrical properties, Degasefication, Corrosion inhibition.

Results from improved alignment and concentricity, optimization of cathode coating and improved exhaust fixturing are now being applied to regular production tubes. Best results during humidity test have been obtained by improving plating techniques and controls to minimize metal shell corrosion. The improved tubes have given superior life test results with the anode seal temperature at 225C. The inverted cathode support ring results in cathode subassemblies with better uniformity and increased ruggedness. The temperature controller has been shown to decrease operator skill necessary to perform uniform exhaust cycles. The extended life test has completed 1795 hours. The complete data and failure analysis will be presented in an addendum to the Final Report. (Author)

AD-606 328 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE DESIGN OF A SEQUENTIAL TEST FOR THE DETECTION OF KNOW SIGNAL IN NORMAL NON-WHITE NOISE,
by Ivan Selin. Nov 61, 14p P-2487
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sequential analysis, Demodulation), (*Demodulation, Sequential analysis), (*Communication theory, Demodulation), Signals, Noise (Radio), Mathematical analysis, Equations, Probability, Sampling, Mathematical models.

This paper considers the design of a sequential test for signals in correlated normal noise. Both discrete and continuous time parameters are considered. The noise is assumed to be stationary in the continuous case, but not in the discrete case. Through the transformation of random variables, it is shown that the test of given strength which minimizes expected test length is Wald's sequential probability (likelihood) ratio test. (Author)

AD-606 351 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Columbia Radiation Lab., New York

comp. by Maureen A. Pearcy. Sep 60, 11p
SB-60-37

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tantalum capacitors, Bibliographies), (*Bibliographies, Tantalum capacitors), Production, Electrolytic capacitors, Microminiaturization (Electronics), Dielectric films, Metal films, Reliability (Electronics)

This bibliography does not cover the technical aspects of tantalum capacitors. As a preliminary search, it is concerned with recent developments in manufacturing processes and with the current market potential for tantalum capacitors. (Author)

AD-606 245 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
OXYGEN-CESIUM PHOTOTUBES,
by A. A. Sokolov. 1964, 21p
AERDL T1726; TT 64 71453

Unclassified report

Trans. of Elektrichestvo (USSR) 1937, no. 6, p. 11-22.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Phototubes, Performance (Engineering)), (*Photocathodes, Photosensitivity), Operation, Photoelectric effect, Anodes (Electron tubes), Gas ionization, Light, Design, Stability, Fatique (Mechanics), Life expectancy, Production, Cesium alloys, Oxygen, USSR.

This study presents detailed technical data on domestic and foreign phototubes, needed to design photoelectric instruments. The comparison of characteristics for various phototubes are used as a basis for suggesting ways of improving the parameters of phototubes manufactured by the Moscow Elektrozavod Plant.

AD-606 309 Div. 8
OTS Prices: HC $2.00/MF $0.50

Antenna Systems Lab., Univ. of New Hampshire, Durham.
PARAMETRIC AMPLIFIER ANTENNA STRUCTURES.
Final rept.,
by Albert D. Frost. 1 Sep 64, 30p
Contract AF19 628 307, Proj. 4600, Task 460002
AFCRL 64 648

Unclassified report

Descriptors: (*Slot antennas, Parametric amplifiers), (*Parametric amplifiers, Slot antennas), Antenna configurations, Antennas, Coaxial cables, Tests, Design, Performance (Engineering).

A summary is presented of theoretical and experimental work carried out in connection with a study of the factors affecting the design and performance of parametric amplifier antennas. Results of tests to verify previously tabulated dual coaxial line coefficients are reported togethe with a final summary of the status of attempts to realize the antenna amplifier in slot form. (Author)

AD-606 311 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Schenectady, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
Scientific rept. no. 8,
by H. H. Woodbury, M. Aven, P. R. Kennicott, and R. N. Hall. Aug 64, 66p
Contract AF19 628 329, Proj. 4608, Task 460805
AFCRL 64 702

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult. Also see AD-603 783.

Descriptors: (*Semiconductor devices, Scientific research), (*Lasers, Design), Solubility, Diffusion, Single crystals, Impurities, Cadmium compounds, Sulfides, Copper, Silver, Zinc compounds, Selenium compounds, Electrical properties, Frequency modulation.

Studies on the systems CdS:Cu and CdS:Ag have led to the following results: copper and Ag diffuse very rapidly in CdS even below 500C; the segregation coefficient of Ag for CdS:Cd changes from 5 x 10 to the 7th power to .001 between 500 and 1000C; and, the solubility of Ag in CdS depends strongly on the partial pressure of Cd over the crystal. The effect of impurities on the electrical characteristics of ZnSe single crystals are investigated by Hall effect studies coupled with mass spectrometric measurements. Considerable differences in the impurity spectrum as well as the electrical behavior of the crystals were found to exist depending on the starting materials, the crystal growth method, and the purification techniques used. A junction laser structure capable of frequency modulation is discussed. Frequency deviations of the order of 100 Gc at modulation frequencies of several Gc appear reasonable. Modulation signals of 200 volts peak-to-peak are required into a load consisting of a pure capacity of a fraction of a pf.

AD-606 313 Div. 8
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
DEVELOPMENT OF A TRANSISTOR DELIVERING AN OSCILLATOR OUTPUT OF 250 MILLIWATTS AT 1.5 GIGACYCLES.
Final engineering rept. for 28 Jun 63-28 Jun 64, 29 Sep 64, 62p TII-03-64-65
Contract NObsr89423, Proj. SR0080304, Task 9347

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Also see AD-436 710.

Descriptors: (*Germanium, Transistors), (*Transistors, Manufacturing methods), (*Silicon, Transistors), Semiconductor devices, Design, Microwave frequency, Radiofrequency power, Oscillators, Military requirements, Tests, Test facilities, Wiring diagrams.

The development of a 1.5 Gc 1/4 watt transistor was started using germanium which appeared then to be the most promising material. During the first six months of the program, considerable progress was made in the construction of germanium planar transistors although none was able to produce the 1/4 watt at 1.5 Gc. At this time developments in the silicon area seemed to indicate the program should be shifted to silicon as the basic material. Permission was obtained from the Bureau of

THE PCM/PS TELEMETRY SYSTEM,
by H. N. Putschi and E. Niemann, Jr.
18 May 59, 20p R59SD361
Contract AF04 647 269

Unclassified report

Paper submitted at the National Telemetry Conference in Denver, Colorado, on 27 May 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Telemeter systems, Pulse modulation), (*Pulse modulation, Coding), Data transmission systems, Spaceborne, Radiofrequency power, Correlators, Phase shift, Signal-to-noise ratio, Operation, Telemetering transmitters, Telemetering receivers, Errors.

The relative transmitter power efficiency of the Pulse Code Modulation/Phase Shift (PCM/PS) system is compared with other efficient telemetry systems. A unique error correcting coding method is described, and its performance improvement shown. The system operation is explained, and its performance at a signal-to-noise ratio of -8 db in the IF channel is illustrated. Correlation detection of the video pulse signal, synchronous RF reception and a novel redundancy coding method are incorporated in a PCM/PS system which in practice performs as well as the theoretical system analyzed by Nichols and Ranch. Further improvement in transmitter power utilization can be obtained if more efficient redundant codes are employed, at a sacrifice in the simplicity of the transmitting equipment. (Author)

AD-606 425 Div. 8
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
STANDARDS AND PROCEDURES FOR EVALUATION OF STABLE FREQUENCY REFERENCES,
24 Aug 59, 26p STL/TR-59-0000-00779
Contracts AF04 647 165 and AF04 647 309

Unclassified report

Supersedes STL/GM-TR-0165-00532, AD-219 419.

Descriptors: (*Oscillators, Standardization), (*Frequency stabilizers, Oscillators), Stability, Measurement, Masers, Frequency multipliers, Mathematical analysis, Functions, Frequency, Test equipment (Electronics), Specifications, Frequency modulation.

The specification and measurement of characteristic imperfections of electronic oscillators that are sufficiently stable in frequency to be useful in accurate measurements of velocity by doppler techniques are presented. Mathematical relations between various properties of frequency-modulated waves are included.

AD-606 471 Div. 8
OTS Prices: HC $1.00/MF $0.50

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
THEORY OF NOISE MEASUREMENTS ON PARAMETRIC SOLID-STATE AMPLIFIER OF TRANSMISSION CAVITY TYPE,
by Hermann A. Haus. 8 Mar 59, 14p T-138-A

Unclassified report

Prepared in cooperation with Raytheon Co., Waltham, Mass.

Descriptors: (*Parametric amplifiers, Noise (Radio)), (*Noise (Radio), Measurement), Transistor amplifiers, Optimization, Mathematical models, Equations, Electrical impedance, Transformers, Bandwidth, Transducers, Gain, Circuits, Waveguide circulators, Theory.

This memo considers the case when a transformer is used between the parametric amplifier and the second stage allowing for variation of the input impedance of the second stage as seen at the parametric amplifier terminals. It is shown that by a proper adjustment of the transformer ratio the optimum noise performance of the parametric amplifier can be achieved and the noise contributed by the second stage can be suppressed. This is accomplished at the sacrifice of the bandwidth obtainable with a circulator which, as has been shown elsewhere, accomplishes the optimum noise performance. However, the transformer scheme may well be used to determine the fundamental noise parameter of the amplifier if it turns out to be practicable experimentally.

AD-606 476 Div. 8, 20
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Baltimore, Md.
THERMIONIC DOUBLE-DIODE PROGRAM.
Quarterly technical progress rept. for 16 Jun-15 Sep 64,
by T. H. Cox, R. L. Hobbs, W. J. Levedahl, J. D. Long, and J. E. Monroe, Jr. 30 Sep 64, 52p MND-3149-2
Contract AF33 615 1289, Proj. 8173, Task 817305

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 917.

Descriptors: (*Thermionic converters, Diodes (Electron tubes), (*Diodes (Electron tubes), Design), Manufacturing methods, Thermionic emission, Electron bombardment, Modules (Electronic), Reactor fuels, Electrical properties, Test equipment, Tests.

Fabrication of all components for the two improved double-diode modules and test fixtures was completed. One module (IDDM-1) was assembled and outgassing initiated. Final assembly of IDDM-2 will start, following the evaluation of the initial test results of IDDM-1. Fabrication and pretest examination of the fueled emitters for the thermal endurance and vacuum emission tests have been completed. Preliminary testing has been initiated.

AD-606 477 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Crystalonics, Inc., Cambridge, Mass.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS.
Quarterly rept. no. 4, 1 Apr-30 Jun 64,
by John R. Williams. 30 Jun 64, 40p
Contract DA36 039AMC01483E

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 433.

Descriptors: (*Transistors, Manufacturing methods), (*Reliability (Electronics), Transistors), Bonding, Dies, Chemical milling, Vacuum furnaces, Controlled atmospheres, Encapsulation, Industrial equipment.

Ultrasonic bonding has been discarded in preference to a new-metallization ball-bonding technique. All production FETs are being die-to-header bonded using a

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly rept. no. 8, 16 Sep-15 Dec 57,
by P. Kusch. 15 Dec 57, 48p CU-8-57-SC-64630-Physics
Contracts DA36 039SC64630, DA36 039SC73279,
Proj. 102B, Task 3 99 06 108

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetrons, Electronics), (*Microwave equipment, Design), (*Masers, Electronics), Cerenkov radiation, Microwave spectroscopy, Molecular beams, Hyperfine structure, Atoms, Millimeter waves, Crystal detectors, Atomic properties, Molecular properties, Solid state physics, Very high frequency, Crystals, Vapors, Alkali metals, Halides.

Results are presented on the program of the development of magnetrons at very high frequencies and at considerable power levels. Of particular interest is the work on harmonic generation in magnetrons. Work is reported on the solid state maser. New measurements of relaxation processes in various solids are discussed with a view to the application of solids to masers. Spectroscopic investigations of several systems by maser methods, microwave absorption techniques, and molecular beam methods are described. Continuing work on the chemical and physical properties of the alkali halide vapors is discussed.

AD-606 390 Div. 8, 30
OTS Prices: HC $4.00/MF $0.75

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
TRANSISTORIZED SHIFT REGISTER.
Bachelor of Science thesis,
by William H. Schoendorf. Jun 57, 110p T-126
Contract AF04 645 9, Proj. 52 126

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transistors, Magnetic cores), (*Magnetic core storage, Transistors), Delay circuits, Diodes, Peutodes, Radiofrequency pulses, Switching circuits, Voltage, Electric currents, Wiring diagrams, Experimental data.

The objective was to study a transistorized magnetic core shift register and to evaluate a suitable power transistor as a possible driving source for the register. Investigation of the register was originally carried out using a pentode driver in order to offer a means for comparison with the transistor shifting source. The Western Electric GA-52830 PNP junction transistor was found to meet the register requirements quite satisfactorily. Operating regions of the shift register were obtained using this transistor in the grounded emitter and grounded base configurations, and the latter was found to be more successful. It was possible to drive thirty cores quite reliably using the grounded base configuration, and the operating regions obtained compared favorably with those of the vacuum tube. (Author)

AD-606 417 Div. 8, 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
ON THE OUTPUT PROBABILITY DENSITY FUNCTION OF A LAMINAR DEVICE WITH CERTAIN NON-GAUSSIAN RANDOM INPUTS,
by G. M. Northrop. Feb 62, 66p P-2536

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Low-pass filters, Stochastic processes), (*Statistical functions, Probability), Filters (Electromagnetic), Real time, Statistical processes, Nonlinear systems, Diffusion, Partial differential equations.

The classical problem of determining the output probability density function (p.d.f.) of a zero-memory, one-to-one nonlinear device followed by a linear filter is treated. When the input random process is stationary, gaussian, and 1st-order Markoff, the output p.d.f. is shown to be the solution to a certain Fokker-Planck Forward Diffusion Equation. (Author)

AD-606 419 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co.,
Philadelphia, Pa.
INTERACTION OF A NON-UNIFORM PLASMA WITH MICROWAVE RADIATION,
by Milton M. Klein, Howard D. Greyber,
Jean I. F. King, and Keith A. Brueckner. 23 Nov 59,
39p R59SD467
Contract AF30 602 1968

Unclassified report

Presented at the Plasma Sheath Symposium,
Boston, Mass., 7-9 Dec 59. Prepared in cooperation with Pennsylvania Univ., Philadelphia.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma sheath, Radio transmission), (*Wave transmission, Plasma sheath), Microwaves, Mathematical analysis, Integration, Electron density, Electric fields, Refractive index, Reflection, Absorption, Propagation, Plasma physics.

An investigation was made of the interaction of microwave radiation with a non-uniform plasma for both normal and non-normal incidence of the radiation. For the case of normal incidence the wave equation was solved by numerical integration. The results show that, for a large range of collision frequencies, a major fraction of the incident radiation is absorbed by the plasma except for very sharp density gradients. The reflection coefficient has been obtained for a large range of the governing parameters, i. e., electron density gradient, wavelength of the incident radiation, and collision frequency. For the case of non-normal incidence the radiation does not penetrate into the region of rapidly changing index of refraction so long as it is not too close to normal incidence. The ray path has therefore been calculated by geometrical optics and the absorption within the plasma has been obtained by the WKB method. Because of the greater complexity of the problem for the non-normal case, the calculations have been restricted to the short wavelength region. The results show that the absorption coefficient varies very little and remains large over a wide range of angles of incidence, but drops off rapidly beyond 45 degrees. (Author)

AD-606 420 Div. 8, 5
OTS Prices: HC $1.00/MF $0.50

Space Sciences Lab., General Electric Co.,
Philadelphia, Pa.

analysis, Scanning.

The diffracted field that arises when an incident electromagnetic surface wave strikes the edge of a right-angle bend at an oblique angle is investigated. One face of the bend supports the surface wave and the other face is a perfect conductor. This diffraction problem is related to the scanning surface wave antennas. An analysis of oblique surface waves on an infinite impedance plane is first presented graphically. We treat two cases. In one case the edge of the bend is parallel, and, in the other case, perpendicular, to the perfectly conducting direction of the impedance plane. When the surface waves is incident normally, these special cases reduce to the normal TM and TE surface waves respectively. The mathematical formalism of the first case may be reduced to that of a two dimensional TM problem which has been solved previously. The second case involves two coupled mixed boundary conditions and is exactly analyzed in detail. The effect of the obliquity on the reflection coefficient and the radiation pattern under various conditions is discussed. (Author)

AD-606 575 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LIKELIHOOD RATIO FILTER FOR THE DETECTION OF GAUSSIAN SIGNALS IN WHITE NOISE,
by T. W. Mullikin and Ivan Selin. Sep 64, 25p
RM-4207-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Radiofrequency filters, Integral equations), (*Integral equations, Radiofrequency filters), Demodulation, Communication theory, Signals, Probability, Statistical processes, Integral transforms.

In the design of filters of a type that is used in radar and communication circuits a certain integral equation arises. The present Memorandum applies a technique developed earlier by T. W. Mullikin to the solution of this equation. It should be of interest to mathematicians and engineers concerned with filter design. (Author)

AD-606 602 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE UTILITY OF A COMMUNICATION CHANNEL AND APPLICATIONS TO SUB-OPTIMAL INFORMATION HANDLING PROCEDURES,
by M. B. Marcus. 9 Dec 57, 16p P-1228
Unclassified report

Descriptors: (*Communication theory, Equations), (*Dynamic programming, Communication theory), Statistical analysis, Optimization, Probability, Coding, Signals.

The functional equation technique of dynamic programming is used to analyze some extensions of the Kelly-Bellman-Kalaba model of communication, and to analyze a null-zone reception system. The role of suboptimum systems is emphasized. (Author)

AD-606 613 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTE ON THE MINIMUM VARIANCE OF UNBIASED ESTIMATES OF DOPPLER SHIFT,
by P. Swerling. 7 Jan 58, 8p P-1247
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Doppler effect, Mathematical analysis), (*Mathematical analysis, Doppler effect), Functions, Integral transforms, Calculus of variations, Radar signals.

The calculation of the minimum variance of unbiased estimates of doppler shift is considered when the received waveform is observed against a background of additive white Gaussian noise. (Author)

AD-606 631 Div. 8, 25, 26
OTS Prices: HC $6.00/MF $1.25

Electron Physics Lab., Univ. of Michigan, Ann Arbor.
APPLIED RESEARCH IN MICROWAVE AND QUANTUM ELECTRONICS.
Final rept. for 5 Feb 62-5 Feb 64,
by J. E. Boers, H. K. Detweiler, G. I. Haddad, G. Hok, and G. T. Konrad. Aug 64, 240p
Contract AF33 657 8050, Projs. 4156, 05000, Task 415603
AL TDR64 158
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Microwave equipment, Scientific research), (*Plasma physics, Electronics), (*Noise, Electron beams), (*Electron guns, Crossed field devices), (*Materials, Thermal conductivity), Electron tubes, Traveling-wave tubes, Microwave amplifiers, Beryllium compounds, Oxides, Brazing, Dielectrics, Helixes, S band, X band, Masers, Millimeter waves, Field theory, Cerenkov radiation, Plasma medium, Plasma oscillations, Microwave oscillators, Digital computers, Performance (Engineering), Tungsten, Gases, Manufacturing methods, Electromagnetic waves, Noise (Radio).

Work areas for this program consisted of investigations of techniques in the realm of plasma, low noise and quantum electronics and included the related areas and associated devices. Work accomplished in the following areas of investigation is reported: A. High-thermal-conductivity materials for high-power microwave devices. B. Various low-noise studies including multi-dimensional noise analyses and several maser schemes for millimeter-wave operation. C. The interaction of electromagnetic waves with dense plasmas in both relativistic and nonrelativistic domains. D. Generation of high-frequency, high-power electromagnetic radiation. E. Research on the improvement of crossed-field convergent flow electron guns. (Author)

AD-606 635 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
INVESTIGATION OF LINEAR BEAM AND NEW CONCEPTS OF MICROWAVE POWER GENERATION.
Quarterly progress rept. no. 3,
by G. C. Dalman and L. F. Eastman. Aug 64, 87p
Contract AF30 602 3243, Proj. 5573, Task 557303
RADC TDR64 278
Unclassified report

Legibility of this document is in part unsatisfactory.

heavy gold plate on dice and headers. A slight modification has been made in the mask design to facilitate bonding. Mesa etching fixtures and slice preparation fixtures are complete and are in use in the production process. Various experiments have been run utilizing various dew point ambients, coating agents, and bakeouts. As a result, production units are being vacuum baked at 200C. and packaged in a dry nitrogen atmosphere of -60C. dew point or better. Life test racks are being constructed. A manual of Q.C. procedures has been prepared. (Author)

AD-606 484 Div. 8, 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR FREQUENCY STABILIZATION OF A STATIC CONVERTER,
by G. M. Vedeneev. 9 Sep 64, 9p
FTD TT64 478; TT 64 71477

Unclassified report

Unedited rough draft trans. of Russian patent 154895 (appl. 794724/24-7, 30 Jul 62).
A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Frequency stabilizers, Motor generators), (*Motor generators, Frequency stabilizers), Transistors, Generators, Voltage, Phase shift, Automatic, Rectifiers, Electric filters, Design, USSR.

A transistorized device for stabilizing the frequency of a static converter with stabilization of the output voltage, which contains a master generator is presented. For the purpose of simplifying the device, the generator is connected up through a rectifier and a filter to the output terminals of the converter.

AD-606 492 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR NONMECHANICAL OSCILLATION OF THE DIRECTIONAL PATTERN OF MULTIOSCILLATOR ANTENNAS,
by A. V. Vitko and L. N. Deryugin. 9 Sep 64, 8p
FTD TT64 477; TT 64 71468

Unclassified report

Unedited rough draft trans. of Russian patent 154,301, appl. no. 768,151/26-9, 9 Mar 62.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Antennas, Design), (*Phased arrays, Phase shifters), (*Antenna radiation patterns, Oscillation), Antenna feeds, Circuits, Scanning, Oscillators, Phase shift, USSR.

The invention consists of a device for nonmechanical oscillation or swinging of the pattern of directionability of multioscillator antennas, which has a number of controlling phase shifters connected into the feed channels of the oscillators, which is distinguished by the fact that for the purpose of obtaining sufficiently high efficiency of the antenna while using phase shifters with relatively little efficiency or reduction of the number of controlling factors, the connecting of the basic feed channel with the oscillators is effected by means of single-type dividers of power with three inputs into two terminal ones of which there are connected phase shifters with opposite directions of the phase change, the said phase shifters being controlled by one and the same factor (voltage, current, or common mechanical drive). (Author)

AD-606 493 Div. 8
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE THEORY OF FUNCTIONAL GENERATORS OPERATING ON A CATHODE RAY TUBE,
by O. I. Petrenko. 19 Aug 64, 33p
FTD TT64 379; TT 64 71469

Unclassified report

Unedited rough draft trans. of Avtomatyka (USSR) 1962, v. 7, no. 2, p. 26-41.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photometers, Measuring devices (Electrical and electronic)), (*Cathode ray tube screens, Photometers), Cathode ray tubes, Reproduction, Photomultipliers, Images, Brightness, Photocathodes, Sensitivity, Optical equipment, Operation, Theory, Mathematical analysis, Linear systems, USSR.

This report describes a functional transformer-photoformer, serving for the transformation of graphic images of an analytical or experimental function of a certain variable into an electric form of voltage for subsequent utilization during measurements and adjusting various electron blocks or introduction into a modeling device. The device, in essence, is a follow up system by position, of which the operating element is the beam of a cathode ray tube (CRT), enveloping the profile of a mask corresponding to a nonlinear dependence fixed for reproduction. The calculations for a photoformer, with band pass of several kc and accuracy of 1-2 per cent, are presented. The mode of operation of the arrangement and the basic static equations of the system are formulated. It was shown that in certain limits, the system is approximately linear.

AD-606 508 Div. 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME SIMPLE EXAMPLES OF SINGULAR DETECTION OF CONTINUOUS SIGNALS IN NOISE,
by Ivan Selin. Dec 61, 8p P-2498

Unclassified report

Descriptors: (*Statistical analysis, Communication theory), (*Demodulation, Statistical analysis), (*Communication theory, Demodulation), Probability, Mathematical prediction, Statistical functions, Taylor's series, Integral transforms, Functions.

AD-606 513 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
THE DIFFRACTION OF OBLIQUE SURFACE WAVES BY A RIGHT-ANGLE BEND,
by S. N. Karp and T. S. Chu. Jul 64, 34p EM-190
Contract AF19 628 3868, Proj. 5635, Task 563502
AFCRL 64 599

Unclassified report

Descriptors: (*Electromagnetic waves, Diffraction), (*Antennas, Electromagnetic waves), Waveguide bends, Electrical impedance, Propagation, Reflection, Vector

AD-606 681 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Western Electric Co., Inc., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE, MECHANIZATION OF SEMICONDUCTOR DEVICES 2N559 - 2N1094.
Quarterly progress rept. no. 26, 1 Apr-30 Jun 64, by M. N. Reppert. 30 Jun 64, 44p
Contract DA36 039sc72729, Proj. 53888PP56 81 81
Unclassified report

Descriptors: (*Semiconductor devices, Production), (*Transistors, Manufacturing methods), Automation, Machines, Bonding, Electric wire, Ultrasonic radiation, Chemical milling, Diffusion, Silanes, Coatings, Cleaning, Infrared detectors, Reliability (Electronics), Guided missile components, Germanium.

Progress is reported on the design and development of high-volume production equipment for use in the manufacture of semiconductor devices.

AD-606 695 Div. 8
OTS Prices: HC $1.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
BROADBAND SOLID-STATE SWITCHES.
Quarterly rept. no. 4, 1 Apr-30 Jun 64, by L. Nathanson. 30 Jun 64, 18p
Contract NObsr89463, Proj. SR0080302, Task 9604
Unclassified report

See also AD-600 290.

Descriptors: (*Microwave equipment, Electronic switches), (*Semiconductor devices, Electronic switches), (*Electronic switches, Broadband), Diodes (Semiconductor), X band, Transmission lines, Transformers, L band, Standing wave ratios.

Included in the report is data pertaining to high power measurements of an X-band prototype and six radially mounted diodes in a 6.25 ohm line section. Also, VSWR performance data on the eight section 50 to 6.25 ohm matching transformers for L/S-band is presented. (Author)

AD-606 702 Div. 8, 2, 25
OTS Prices: HC $2.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
A PRACTICAL DETERMINATION OF LOGARITHMIC-AMPLITUDE TIME SPECTRUM UNDER ARBITRARY TURBULENCE,
by Walter J. Brinks. 14 Jul 64, 26p
Projs. 1A013001A039, A0200
HDL TR1241
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Atmospheric motion, Electromagnetic waves), Turbulence, Harmonic analysis, Amplitude modulation, Special functions (Mathematical), Numerical method and procedures.

This report presents a method for calculating the time spectrum of the logarithmic-amplitude fluctuations of an electromagnetic wave propagating through a turbulent atmosphere, when the turbulence is a given function of position over the radiation path. (Author)

AD-606 704 Div. 8, 14
OTS Prices: HC $3.00/None

International Resistance, Co, Philadelphia, Pa.
PRECISION VOLUME RESISTOR.
Interim development rept. no. 4, 1 Mar-31 May 64, by M. Burk, C. Huang, and K. M. Merz. 20 Jun 64, 60p
Contract NObsr89439, Proj. 008030, Task 9598
Unclassified report

Legibility of this document is in part unsatisfactory. Limited supply on hand: when exhausted, document will not be available.

Descriptors: (*Resistors, Manufacturing methods), (*Ceramic materials, Resistors), (*Composite materials, Resistors), Nickel, Powder metals, Particle size, Copper, Aluminum compounds, Magnesium compounds, Oxides, Thermal expansion, Resistance (Electrical), Vanadium compounds, Temperature, Carbon resistors, Palladium, Glass resistors, Glass, Carbon, Silicon compounds, Silver, Life expectancy, Electrical properties, Binders.

Nickel powders for use as the conductive phase in dispersed metal-ceramic resistor systems have been prepared with particle sizes in the range 0.2 - 0.7 microns. Copper and coprecipitated copper-nickel powders have also been prepared and used in the fabrication of pressed resistor bodies. Test samples have been prepared using as the insulating phase cordierite, alumina and magnesia in order to investigate the effect of thermal expansion differences on resistance and temperature coefficient of resistance. Data is not yet available. Resistor bodies have been made and electrical measurements taken on compositions based on V_2O_3. Large negative temperature coefficients have been observed which were found to be due to the presence of V_2O_4. Resistors based on carbon, palladium, alumina and glass have been fabricated and range and T. C. measured. An increase in resistance with an increase in conductor content has been found to be due to a reaction between Pd, C and silica to form Pd_2Si at temperatures above approximately 1000 C. New formulations which mature below 1000 C are under investigation as well as the use of glasses which do not contain silica. (Author)

AD-606 706 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 63, by William Rosenberg. 31 Dec 63, 32p
Contract DA36 039sc86741, Proj. 19063PP62 81 81
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Welding, Ultrasonic radiation), (*Electron tubes, Welding), Electric connectors, Manufacturing methods, Electron tube parts.

Successful ultrasonic welding of the 72-weld Type 6080WB electron-tube mount with production tooling was achieved. (Author)

AD-606 707 Div. 8, 14
OTS Prices: HC $2.00/None

International Resistance Co., Philadelphia, Pa.
PRECISION VOLUME RESISTOR.
Interim development rept. no. 5, 1 Jun-31 Aug 64, by C. Huang and Kenneth M. Merz. 20 Sep 64, 48p
Contract NObsr89439, Proj. SR008030, Task 9598
Unclassified report

Reproduction has been made from best available copy.
Also see AD-601 154.

Descriptors: (*Plasma physics, Electron beams), (*Electron beams, Microwaves), (*Klystrons, Electron beams), (*Microwaves, Electron beams), Radiofrequency power, Microwave equipment, Lasers, Generators, Microwave amplifiers, Cavity resonators, Space charges, Velocity, Noise (Radio), Circuits, Electron tubes, Electromagnetic pulses, Cathodes (Electron tubes), Electron guns, Light pulses, Photoelectric effect, Design, Propagation.

The shielded-gun (Brillouin flow) beam tester, when outfitted with a larger pinhole in the probe, yielded satisfactory noise growth data which is highly reminiscent of peak velocity growth data previously reported. Studies have continued of efficiency enhancement of multi-cavity klystrons resulting from the application of d.c. bias to the electron beam. In the studies of the efficiency of two-cavity klystrons, the optimum location of the output cavity was determined theoretically for two cases; the conventional gridless cavity case and a gridless double-gap cavity. The nanosecond pulse studies of linear beam tubes has been extended into the nonlinear operating range. The d.c. beam and plasma diagnostic measurements obtained on the Plasma Analyzer are discussed. Initial results have been obtained on the formation of an electron beam using laser-stimulated emission. A simple theory has been formulated for the beam admittance characterizing the dense electron beam obtained from laser-stimulated emission.

AD-606 658 Div. 8, 5, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPRAISAL OF ERROR PERFORMANCE IN DATA TRANSMISSION,
by Pierre Mertz. Jul 62, 47p P-2587
Unclassified report

Descriptors: (*Data transmission systems, Errors), (*Communication theory, Data transmission systems), Performance (Engineering), Probability, Statistical analysis, Special functions (Mathematical), Statistical functions, Measurement, Experimental data.

Evaluation of the error performance of data transmission systems faces problems because the error incidence does not follow conventional statistical laws for random occurrence. It has been found to follow hyperbolic statistical laws reasonably well, and these can be used as a guide to measurement procedures. A brief review is given of the Poisson and hyperbolic laws and their comparison with experience from rather varied sources. Some analysis is presented of the error incidence and grouping which occur during periods of poor operation, and the influence which these distributions have on the organization of measurement plans for the obtaining of significant results. Possible alternatives are suggested for characterizing error performance to the long-time average error rate commonly used.

AD-606 669 Div. 8, 4, 25
OTS Prices: HC $1.00/MF $0.50

Uppsala Univ. (Sweden).
SOME REMARKS ON THE PARISER-PARR-POPLE METHOD.
Scientific rept. no. 12,
by Kimio Ohno. 15 Apr 64, 24p
Contract AF61 052 701
ARL 64 203
Unclassified report

Descriptors: (*Molecular electronics, Numerical methods and procedures), Atomic orbitals, Quantum mechanics, Integrals, Valance, Carbon, Nitrogen, Atoms, Ions, Chemical bonds, Calculus of variations.

Basic assumptions which characterize the Pariser-Parr-Pople method of computing molecular electronic wave functions are critically examined. By restricted variational calculation of the valence state of carbon and nitrogen atoms and ions, it is demonstrated that the usual methods of evaluation of one-centre Coulomb integrals and atomic core energies are rather good. A semi-theoretical means of estimating the core resonance integral is proposed and shown to give fair agreement with the empirical values for C-C, O-O, C-N, and C-O bonds. (Author)

AD-606 677 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR COLUMBIUM CAPACITORS.
Quarterly rept. no. 4, 26 Mar-26 Jun 64,
by J. H. D. Folster, E. E. Holley, and A. Whitman.
26 Jun 64, 16p
Contract DA36 039AMC01468E
Unclassified report

Descriptors: (*Capacitors, Niobium), (*Manufacturing methods, Capacitors), Capacitance, Voltage, Life expectancy, Performance (Engineering), Reliability (Electronics), Stability.

During this quarter, construction of the four ratings required for the preproduction sample was continued. Manufacture of three of these ratings was completed, and they are ready for testing. Preliminary findings in the study to determine the effects of voltage and capacitance derating indicate that voltage derating can be used to achieve better leakage current levels and improved stability of this important parameter. However, it is cautioned that the leakage current behavior will still be inferior to that demonstrated by solid tantalum capacitors. (Author)

AD-606 680 Div. 8, 6, 25
OTS Prices: HC $3.00/MF $0.75

ITT Industrial Labs., Fort Wayne, Ind.
IMPROVED QUANTUM EFFICIENCY LASER DETECTORS.
Interim engineering rept.
by E. H. Eberhardt and J. L. Gumnick. 9 Oct 64,
64p ITT-3304
Contract AF33 615 1596
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Lasers, Detectors), (*Detectors, Lasers), Photocathodes, Theory, Shock tubes, Electron tubes, Electron multipliers, Anodes (Electron tubes).

Contents: Photocathode studies (theoretical analysis, experimental results and procedures, stock tubes, special tubes, vidissector tubes); Electron multiplier improvement, (multiplier specification requirements, proposed solutions, reducing the number of stages, increasing the applied voltage/stage, improved anode geometry, resistive end plates, improved first dynode and front end geometry, multiplier test equipment).

Descriptors: (*Radiofrequency, Compatibility), (*Radio interference, Reduction), (*Frequency, Selection), Radio reception, Radio equipment, Circuits, Mathematical analysis, Theory.

The mutual interference chart (MIC) gives the compatibility that exists between the channels of a radio set. This property of the chart is used to determine classes of frequencies that are compatible with given transmitting or receiving frequencies. The approach is based on the elementary theory of classes. The class characterization implies a set of frequency assignments. The general theory for obtaining these assignments is developed. The assignment can be constructed not only to eliminate mutual interference from co-located sources, but also to control co-channel and other interference from distant sources. Analytically, the general theory can be applied without excessive labor only to the simple reentrant circuit of three terminals in the case in which the MIC consists solely of a diagonal swath.

AD-606 807 Div. 8, 25, 26
OTS Prices: HC $1.00/MF $0.50

Knights (James) Co., Sandwich, Ill.
CRYSTAL UNITS TYPE CR-(XM-11)/U, 1 TO 20 MC IN THE TYPE HC-27/U GLASS HOLDER.
Progress rept. no. 12, 1 Aug-31 Oct 63,
by R. E. Bennett. 31 Oct 63, 18p
Contract DA36 039sc81274

Unclassified report

Also see AD-603 677.

Descriptors: (*Crystals, Semiconductor devices), (*Crystal holders, Manufacturing methods), High frequency, Quartz, Design, Specifications, Test methods, Bonding, Performance (Engineering), Production, Glass.

Production of 4.3 mc, 9 mc, 15.5 mc, and 20 mc, CR-(XM-11)/U units is described. These units are essentially CR-18/U, except that they are in the HC-27/U glass holder. (Author)

AD-606 808 Div. 8, 25, 26
OTS Prices: HC $1.00/MF $0.50

Knights (James) Co., Sandwich, Ill.
CRYSTAL UNITS TYPE CR-(XM-11)/U, 1 TO 20 MC IN THE TYPE HC-27/U GLASS HOLDERS.
Progress rept. no. 13, 1 Nov 63-31 Jan 64,
by R. E. Bennett. 31 Jan 64, 16p
Contract DA36 039sc81274

Unclassified report

Also see AD-603 677.

Descriptors: (*Crystals, Semiconductor devices), (*Crystal holders, Manufacturing methods), High frequency, Quartz, Design, Specifications, Test methods, Performance (Engineering), Wiring diagrams, Production, Inductance, Bonding, Glass.

Production of 4.3 mc, 9 mc, 15.5 mc, and 20 mc, CR-(XM-11)/U units is described. These units are essentially CR-18/U, except that they are in the HC-27/U glass holder. (Author)

AD-606 812 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric, Co., Philadelphia, Pa.
INTERACTION OF MICROWAVE RADIATION WITH A NON-UNIFORM PLASMA SHEATH ADJACENT TO A CONDUCTING WALL,
by Milton M. Klein. 1 Aug 61, 36p R61SD118

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Radio transmission, Plasma sheath), (*Plasma sheath, Radio transmission), Microwaves, Gas ionization, Electron density, Nose cones, Re-entry vehicles, Electromagnetic wave reflections, Absorption, Numerical analysis, Propagation.

The interaction of microwave radiation with a non-uniform plasma sheath terminated by a conducting wall has been obtained both by numerical solution and by the WKB method. Two electron density profiles, one of exponential form and the other parabolic, were chosen for the investigation. For the exponential profile the reflection coefficient decreases from unity at low electron densities to an asymptotic value at high electron densities; this limiting value is identical with the corresponding result for the infinite plasma. For the parabolic profile, however, as the electron density increases the reflection coefficient decreases from unity to a minimum and then increases to unity as the electron density becomes large. The results show, in addition, that the distribution of absorbed flux is much more markedly affected by an increase in maximum electron density for the case of the parabolic profile than it is for the exponential case.

AD-606 821 Div. 8, 12, 30
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
PEAK CRITERION IN RANDOM-SINE VIBRATION TESTING,
by H. R. Spence and H. N. Luhrs. Revised Jan 61,
15p STL/TN-60-0000-19201

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic equipment, Environmental tests), (*Environmental tests, Vibration), (*Vibration, Standards), Spaceborne, Test methods, Probability, Statistical functions, Mathematical analysis.

Sinusoidal vibration has practical value as a substitute for random vibration in equipment qualification testing. How and when to employ a sinusoidal substitution is discussed in this paper. In particular a damage criteria is discussed which relates the number of sinusoidal peaks occurring while passing through a resonance to the number of random peaks exceeding a specified amplitude value. Formulae are given for the sine-random response relationship with formulae and a diagram for the random test duration to be used with the amplitude relationship. (Author)

AD-606 828 Div. 8, 15
OTS Prices: HC $3.00/MF $0.75

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.

Legibility of this document is in part unsatisfactory. Limited supply on hand: when exhausted document will not be available.

Descriptors: (*Resistors, Manufacturing methods), (*Ceramic materials, Resistors), (*Composite materials, Resistors), Palladium alloys, Silver alloys, Glass, Plating, Copper, Bismuth compounds, Oxides, Aluminum compounds, Powders, Temperature, Resistance (Electrical), Life expectancy, Moisture, Electrical properties, Binders, Palladium.

Resistors based on palladium or palladium/silver dispersed in a ceramic matrix have been fabricated and their ranges and temperature coefficients measured. Pre-mil screening tests were completed. Termination methods for the solid slugs were investigated. A modified electroless cu-plating process was found acceptable and gave pull strengths of approximately 15 lbs. The fact that bismuth trioxide additions to the palladium-ceramic system shifts temperature coefficient towards negative values was established. The amount used in various ranges in order to minimize T. C. is under investigation. It has been determined that the Pd-ceramic system, of all the systems studied, offers the most promise of producing a volumetric resistor capable of MIL-R-10509D characteristic. For this reason all other phases of the program have been terminated and work will be concentrated on the Pd-ceramic system for the remainder of the contract. (Author)

AD-606 737 Div. 8
OTS Prices: HC $6.00/MF $1.50

General Electric Co., Syracuse, N. Y.
ATMOSPHERIC AND EXTRATERRESTRIAL EFFECTS ON RADIO WAVE PROPAGATION.
Technical information series,
by G. H. Millman. Jun 60, rev. Dec 60, 267p R60EMH36
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radio transmission, Radiofrequency interference), (*Radiofrequency interference, Atmospherics), (*Atmospherics, Propagation), Troposhere, Ionospheric propagation, Radar signals, Very high frequency Ultrahigh frequency, Radio waves, Atmospheric refraction, Doppler effect, Gass ionization, Electron density, Attenuation, Aurorae, Meteors, Electromagnetic wave reflections, Extraterrestrial radio waves, Mathematical analysis, Graphics, Degradation, Atmospheric models.

An important consideration which must be taken into account in the formulation and design of any radar system is the degradation in the signal-target information introduced by the atmosphere. The propagational effects which are prevalent when radio waves traverse the atmosphere manifest themselves as refractive bending, time delays, Doppler errors, rotation of the plane of polarization (Faraday effect) and attenuation. In addition, the presence of celestial radio noise-sources such as the sun and radio stars are capable of reducing the overall system sensitivity. Auroral and meteoric ionization at ionospheric heights, and the moon also introduce interference and clutter problems. These phenomena are described and assessed with application to frequencies in the VHF and UHF range. The calculations which are presented are based on a normal static, undisturbed atmosphere. Atmospheric anomalies brought about by man-made artificial devices are not considered.

AD-606 772 Div. 8, 30, 32
OTS Prices: HC $3.00/MF $0.75

Office of Naval Research, Washington, D. C.
INFORMATION SYSTEMS SUMMARIES.
Edition no. 2.
Jul 64, 92p
ONR ACR97
Unclassified report

Descriptors: (*Communication theory, Reviews), (*Computers, Scientific research), Programming (Computers), Computer logic, Systems engineering, Information retrieval, Machine translation, Speech, Pattern recognition, Data processing systems.

The task is a theoretical study of multidimensional information. An attempt is made to generalize the concepts of classical one-dimensional information theory to several dimensions. Studies of the natural biological world are sometimes used to suggest optimum methods of information translation. The major effort of the project was directed toward determining the waveshape and coherence properties of natural light on the basis of quantum mechanics. An investigation was made which showed that carriers of biochemical information in the blood and elsewhere in the body have properties which are analogous to those of radio frequency carriers. As a consequence of the investigation, it appears that a fuller consideration of the selectivity aspects of biological carriers would lead to a better understanding of certain biological phenomena. (Author)

AD-606 794 Div. 8
OTS Prices: HC $2.00/MF $0.50

Radiation Lab., Univ. of Michigan, Ann Arbor.
STUDY AND INVESTIGATION OF A UHF-VHF ANTENNA.
Bimonthly rept. no. 10, 1 Jul-31 Aug 64,
by J. E. Herman, S. B. Rhee, G. G. Rassweiler, and A. I. Simanyi. Sep 64, 38p ORA-5549-11-P
Contract AF33 657 10607, Proj. 6278, Task 627801
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Also see AD-603 742.

Descriptors: (*Helical antennas, Design), (*Conical antennas, Design), (*Ferrites, Antenna components), Very high frequency, Ultrahigh frequency, Antenna radiation patterns, Standing-wave ratios, Permeability, Temperature, Magnetic properties, Log periodic antennas, Waveguide slots, Spiral antennas.

The experimental ferrite loading of log conical antennas in a recessed cavity, and a free-standing log conical and helical antenna, reduced the size of the loaded antenna by at least one-half. The corresponding efficiencies of the ferrite-loaded antennas were approximately 25 percent of the unloaded antenna efficiencies. Temperature measurements of permeability show greatly increased losses above 200C. A preliminary study of a helix with ferrite loading is described. (Author)

AD-606 796 Div. 8
OTS Prices: HC $3.00/MF $0.75

Army Electronics Labs., Fort Monmouth, N. J.
CLASSES OF FREQUENCIES FREE OF MUTUAL INTERFERENCE: A THEORY OF FREQUENCY ASSIGNMENTS,
by Nello R. Castellini. Aug 63, 78p
Task 1G6 20501D449 01
USAEL TR2381
Unclassified report

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9. Fluid Mechanics

AD-606 148 Div. 9
OTS Prices: HC $2.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
APPROXIMATE EFFECT OF RING STIFFENER ON THE PRESSURE DISTRIBUTION IN AN OSCILLATING CYLINDRICAL TANK PARTLY FILLED WITH A LIQUID,
by Helmut F. Bauer. 12 Sep 57, 48p
AMC-RA DA-264

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stiffened cylinders, Rings), (*Fluid mechanics, Pressure), Tanks (Containers), Liquids, Oscillation, Numerical analysis, Theory, Guided missiles, Equations.

The pressures measured at the walls of an oscillating, cylindrical tank partly filled with a liquid may be disturbed by the presence of stiffener rings. In order to gain an insight into the character of such disturbances, an approximate theory was developed that corrects the smooth wall solution of the oscillating tank for the effects of horizontal rings. The theory is valid for rings whose width is small as compared to the tank radius. Equations are derived describing the effect of a single, flat ring. However, the theory can be extended to cover any number and cross-section of rings. Numerical calculations were carried out for a tank and pressure pick-up configuration tested at ABMA and intended for use on flying missiles. Though the pressure disturbances extend over the whole height of the liquid in the tank, they are sizable only in the neighborhood of the stiffener ring, and become negligible about two ring widths off the ring. (Author)

AD-606 157 Div. 9
OTS Prices: HC $2.00/MF $0.50

AVCO-Everett Research Lab., Everett, Mass.
AERODYNAMIC COEFFICIENTS FOR ARBITRARY CONVEX AXI-SYMMETRIC BODIES IN FREE MOLECULE FLOW,
by Sheldon Weinbaum and Arnold Goldburg.
Aug 60, 42p Avco-RN-244
Contract AF33 600 41291

Unclassified report

Descriptors: (*Axially symmetric flow, Convex bodies), (*Convex bodies, Aerodynamic characteristics), (*Aerodynamic characteristics, Convex bodies), Fluid flow, Aerodynamic loading, Integrals, Numerical methods and procedures, Fluid mechanics.

This report presents completely general double integrals for the aerodynamic coefficients of an arbitrary axi-symmetric body in any flow field. These integrals represent summations over the entire body surface of the forces and moments acting on local surface elements. The surface forces must, of course, be first determined by the solution of the much more difficult fluid mechanics problem. The latter problem is especially simple in free molecule flow. These surface stresses are derived for the special case of free-molecule flow. The stresses are then expressed in terms of the judiciously chosen, local surface, coordinate system introduced previously which simplified the force and moment summations. When the expressions for the stresses are put in the double integrals mentioned above, the aerodynamic coefficients are obtained directly. Lastly, two approximations for the free molecule aerodynamic coefficients are suggested which permit one of the integrations to be performed analytically. (Author)

AD-606 203 Div. 9, 1
OTS Prices: HC $2.00/MF $0.50

United Aircraft Corp., East Hartford, Conn.
ADDITIONAL CALCULATIONS OF HYPERSONIC DYNAMIC STABILITY.
Quarterly status rept. no. 3, 29 May-28 Aug 64,
by Martin R. Fink. Sep 64, 43p C910188-12
Contract NOw64 0092f
AFCRL 64 539

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Aerodynamic configurations, Stability), (*Hypersonic flow, Numerical analysis), Wing-body configurations, Rectangular bodies, Delta wings, Cylindrical bodies, Slender bodies, Ogives, Fuselages, Dynamics, Blunt bodies.

Calculations of the hypersonic static and dynamic stability of ogive and ogive-cylinder fuselages, and of rectangular and delta wings in the presence of those fuselages, are presented. The results are compared with those calculated by Newtonian theory and by supersonic flow theories. A description is presented of wind tunnel models which are being constructed for tests to evaluate the predicted trends. (Author)

AD-606 216 Div. 9, 30
OTS Prices: HC $2.00/MF $0.50

Air Proving Ground Center, Elgin AFB, Fla.
A PROCEDURE FOR ESTIMATING DOWNWIND DEPOSITION OF SMALL SPRAY DROPLETS,
by Juri V. Nou. Sep 64, 31p
Projs. 2525W3, 5957W1
APGC TR64 66

Unclassified report

Descriptors: (*Sprays, Distribution), Liquids, Drops, Airborne, Wind, Transport properties, Mathematical prediction.

A procedure is described for estimating the amount and the extent of downwind deposition of liquid spray droplets in the 10-200 micro diameter range in terms of mass per area. The approach is based on Stokes' Law and an assumed drop-size distribution. A sample solution of a practical problem follows the theoretical discussion. (Author)

AD-606 223 Div. 9
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
EXPERIMENTAL STUDY OF AN AIRFOIL WITH A BOUNDARY LAYER SUBJECTED TO MAGNETOAERODYNAMIC FORCES,
by Allan B. Schaffer. 3 May 60, 13p
STL/TR-60-0000-09104
Contract AF04 647 30?

Unclassified report

Descriptors: (*Airfoils, Magnetohydrodynamics), (*Magnetohydrodynamics, Airfoils), Glow discharges, Boundary layer, Stalling, Lift, Magnetic fields.

THE THEORETICAL AND NUMERICAL DETERMINATION OF THE RADAR CROSS SECTION OF A FINITE CONE.
Scientific rept. no. 1,
by F. V. Schultz, G. M. Ruckgaber, S. Richter, and J. K. Schindler. Aug 64, 60p PUSEE-TR-EE64-14
Contract AF19 628 1691, Proj. 5635, Task 563502
AFCRL 64 658

Unclassified report

Descriptors: (*Radar echo areas, Conical bodies), (*Electromagnetic waves, Scattering), (*Conical bodies, Radar echo areas), Boundary value problems, Electromagnetism, Numerical methods and procedures, Theory, Digital computers.

This investigation of the radar cross-section of a finite cone can be divided into three areas. First, the exact solution for the scattering of a plane electromagnetic wave by a finite cone is presented. Rigorous electromagnetic theory is used in the solution, and no approximations are made. Secondly, methods of obtaining numerical results for the radar cross-section from the analytic solution by using a digital computer are discussed. The third area is a presentation and discussion of the numerical results obtained. (Author)

AD-606 832 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Electronics Research Lab., Univ. of California, Berkeley.
INTEGRATED UNIJUNCTION TRANSISTOR OSCILLATORS.
Rept. for Jan-Dec 63,
by G. Hachtel and G. Haines. 16 Jan 64, 84p
ERL-63-30
Contracts AF33 616 7553, AF33 615 1045, Proj. 4159, Task 415906
AL TDR64 196

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Harmonic oscillators, Transistors), (*Transistors, Harmonic oscillators), Silicon, Oscillation, Integrated circuits, Performance (Engineering), Design, Electrical impedance, Mathematical models.

In this report, integrated near harmonic oscillators based on Unijunction Transistor (UJT) action are investigated. Conditions for near harmonic oscillation are established in a form appropriate to the treatment of integrated silicon oscillators. The fundamental aspects of UJT action are examined and a modeling procedure is proposed for use in integrated oscillator design. Finally, a complete design procedure for integrated UJT oscillators is presented and applied to the fabrication of planar diffused silicon realizations. The performance of these oscillators is discussed, and compared with the performance of other lumped and integrable oscillators. Publication of this technical documentary report does not constitute Air Force approval of the report's findings or conclusions. It is published only for exchange and stimulation of ideas. (Author)

AD-606 838 Div. 8
OTS Prices: HC $3.00/MF $0.75

Litton Industries, San Carlos, Calif.
RESEARCH ON NOISE IN CROSSED-FIELD GUNS.
Quarterly rept. no. 4, 1 Apr-30 Jun 64,
by R. P. Wadhwa. 20 Jul 64, 66p
Contract NObsr89546

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-600 578.

Descriptors: (*Microwave amplifiers, Crossed field devices), (*Crossed field devices, Noise), (*Electron guns, Design), Gain, Power, Optimization, Space charges, Standing wave ratios.

Design of a short Kino gun to be used in a low noise crossed-field amplifier is discussed. This gun design was based upon the minimization of diocotron gain in the gun region. The design of the amplifier is briefly discussed. Measurements for gain, power and noise figure are described. The beam characteristics can be improved by proper optimization. Results under optimized conditions and measurements on the optimization of noise figure are also discussed. Space-charge smoothing of noise figure is noticed and a minimum noise figure of 16.7 db at S-band was measured. (Author)

AD-606 839 Div. 8
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Syracuse, N. Y.
OPTIMUMLY SPACED ANTENNA ARRAY.
Scientific rept. no. 1,
by S. L. Shih. Sep 64, 34p
Contract AF19 628 3842, Proj. 4600, Task 460006
AFCRL 64 728

Unclassified report

Descriptors: (*Phased arrays, Optimization), Gain, Antenna radiation patterns, Antenna configurations, Phase shift.

The element spacings in non-uniformly spaced antenna arrays which give the maximum gains are determined. Gains higher than those of uniformly spaced arrays are obtained. The formulations cover arrays of isotropic and directive sources. The method of solution is described and the results of several representative cases are presented. It is found that usually the optimum spacings required for maximum gain are almost uniform. (Author)

AD-606 855 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON SOME COMMUNICATION NETWORK PROBLEMS,
by Robert Kalaba. 22 Apr 58, rev. 3 Jun 59, 38p
P-1325

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Communication systems, Mathematical models), (*Networks, Equations), (*Mathematical models, Networks), Linear programming, Dynamic programming, Optization, Probability, Combinatorial analysis, Stochastic processes, Nonlinear systems, Theory.

Several classes of combinatorial problems in the field of communication networks are discussed including the leasing of minimal cost spanning networks, the finding of optimal paths through networks, and the optimal routing of messages in networks. The methods employed involve curious admixtures of the functional equation approach of dynamic programming, linear programming, and various ad hoc procedures.

Descriptors: (*Flutter, Delta wings), (*Supersonic flow, Aerodynamic characteristics), Vibration, Supersonic flight, Harmonic analysis, Equations, Camber, USSR.

AD-606 288 Div. 9, 25
OTS Prices: HC $6.00/MF $1.25

Princeton Univ., N. J.
INTERACTIONS BETWEEN A PARTLY-IONIZED LAMINAR SUBSONIC JET AND A COOL STAGNANT GAS. Technical rept.,
by Martin P. Sherman. Sep 64, 242p AER-707
Contract AF33 657 9962; Grant NSF GP579
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma jets, Jet mixing flow), (*Jet mixing flow, Plasma medium), Subsonic flow, Argon, Helium, Enthalpy, Stagnation point, Thermodynamics, Boundary value problems, Nozzles, Diffusion, Partial differential equations, Transport properties.

The laminar mixing of a high temperature partly ionized subsonic argon plasma jet with a surrounding helium atmosphere was studied both experimentally and theoretically. Experimental measurements of the enthalpy, helium mole fraction, and stagnation pressure were performed with a small calorimetric probe. Assuming local thermodynamic equilibrium, which is shown to be reasonable, these measurements give the thermodynamic state of the gas and its velocity. The problem was considered theoretically using the boundary layer approximation. Results indicate the rapid diffusion of the helium into the jet, and the experiment shows helium diffuses up into the nozzle. The axial temperature gradient is less steep, and that of the velocity still shallower. (Author)

AD-606 339 Div. 9, 8, 12
OTS Prices: HC $1.00/MF $0.50

Lockheed Missile and Space Co., Sunnyvale, Calif.
MISSILE AEROPHYSICS PHENOMENA OF ELECTRONIC IMPORT,
by Daniel Bershader. 20 Aug 57, 22p LMSC-2215
Unclassified report

Paper presented at WESCON, 20 Aug 57. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerodynamic beating, Plasma sheath), (*Plasma sheath, Radio transmission), Hypersonic flight, Guided missiles, Aerospace craft, Communication systems, Radio signals, Attenuation, Guided missile antennas, Turbulent boundary layer, Temperature, Electron density, Ionization, Dissociation, Heat transfer.

This paper describes some features of the environment surrounding missile-type vehicles in hypersonic flight. Emphasis is placed on the physical basis for the phenomena observed or thought to exist. Some remarks on the problem of attenuation of communication signals to and from high speed vehicles by ionization induced near the surface is included.

AD-606 405 Div. 9, 1, 12
OTS Prices: HC $3.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
THE FLUTTER OF TWO-BAY FLAT PANELS OF INFINITE SPAN AT SUPERSONIC MACH NUMBERS,
by M. H. Lock and Edith F. Farkas. 25 Aug 64,
90p TDR-269(4230-10)-9
Contract AF04 695 269
SSD TDR64 164
Unclassified report

Descriptors: (*Flutter, Supersonic flow), Aeroelasticity, Airplane panels, Flat plate models, Boundary layer.

The flutter of two-bay clamped-edge and simply supported panels at supersonic Mach numbers is studied to determine the influence of structural and aerodynamic coupling. It is found that the effect of structural coupling between the panel bays is unimportant both for the 'single-degree-of-freedom' flutter modes that are critical at the lower supersonic Mach numbers and for the critical coupled flutter modes that develop at higher supersonic Mach numbers. The effect of aerodynamic coupling is found to be of importance for the 'single-degree-of-freedom' flutter modes only. Furthermore, the severity of this effect is highly dependent upon the panel boundary conditions. (Author)

AD-606 413 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MODELING CIRCULATORY FLOWS BY THE METHOD OF ELECTRO-HYDRODYNAMIC ANALOGY WITH APPLICATION OF A VORTEX ELECTRIC FIELD,
by G. A. Ryazanov. 12 May 64, 22p
FTD MT63 213; TT 64 71467
Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1961, no. 3, p. 68-77.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid mechanics, Models (Simulations)), (*Electric fields, Vortices), Three-dimensional flow, Model theory, Magnetohydrodynamics, Transformers, Nozzles, Electrical conductance, USSR.

The analogy between the vortex electric field in a conducting medium and the circulatory flow of an ideal liquid is considered and a new method of modeling of three-dimensional circulatory flows, based on the application of toroidal transformers is offered. Installations for the solution of two-dimensional and axially symmetric problems are described and data of control experiments are presented.

AD-606 414 Div. 9
OTS Prices: HC $3.00/MF $0.50

Princeton Univ., N. J.
HEAT TRANSFER IN A RAREFIED GAS BETWEEN PARALLEL PLATES AT LARGE TEMPERATURE RATIOS,
by D. R. Willis. Oct 62, 56p AER-615
Contract AF49 638 465, Proj. 9781
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gas flow, Heat transfer), (*Heat transfer, Gas flow), Flat plate models, Superaerodynamics, Integral equations, Iterative methods, Moments.

This report describes an experiment in which an accelerating magnetoaerodynamic force is applied in the boundary layer above an airfoil for the purpose of altering its stalling characteristics. The magnetoaerodynamic force is produced by the interaction between a surface glow discharge and an orthogonal magnetic field from permanent magnets. In the experiment performed, the magnetoaerodynamic force was unable to alter the lift. Although the experiment could be redesigned with probable success, the work is being terminated because more promising avenues for magnetoaerodynamic research have become available. (Author)

AD-606 224 Div. 9
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ON ONE-DIMENSIONAL CHANNEL FLOW IN THE PRESENCE OF A MAGNETIC FIELD,
by William B. Bush. 4 May 59, 21p
STL/TR-59-0000-00660
Contract AF04 647 309

Unclassified report

Descriptors: (*Fluid flow, Magnetic fields), (*Supersonic flow, Magnetic fields), (*Magnetohydrodynamics, Difference equations), One-dimensional flow, Electric fields, Thermodynamics, Geometric forms.

The differential equations for the one-dimensional, varying-area channel flow of a perfect gas in the presence of a magnetic field are formulated under the restriction that the electric field be zero. The solutions are presented in analytical and graphical form. The results show that with increasing magnetic field the sonic point moves downstream from the channel's throat and that, in general, a larger exit area is needed to obtain a given supersonic flow Mach number. (Author)

AD-606 226 Div. 9, 12
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THE ANALYSIS OF WIND-INDUCED OSCILLATIONS OF LARGE AND TALL CYLINDRICAL STRUCTURES,
by Y. C. Fung. Jun 60, 46p
STL/TR-60-0000-09134, STL-EM-10-3

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Oscillation, Cylindrical bodies), (*Cylindrical bodies, Oscillation), Structural shells, Wind, Vibration, Lift, Drag, Gas flow, Aerodynamic characteristics, Elasticity, Reynolds number, Correlation techniques, Equations, Mathematical analysis, Structures.

A method of analysis of wind-induced oscillations of large and tall circular cylindrical structures is presented. The changes in the nature of wind-induced oscillations of such structures as the Reynolds number of the flow varies from the subcritical to the transitional and then to the supercritical ranges are discussed. The main body of the paper is concerned with the supercritical case only. It appears that, in order to make a realistic prediction of the vibration characteristics of such a structure in wind, the existing aerodynamic data do not suffice, and additional lift-(and drag-) distribution correlation functions would have to be measured. A list of these desired correlation functions are given and an experimental program is formulated. (Author)

AD-606 239 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Princeton Univ., N. J.
THE ANOMALY IN THE APPLICATION OF PLK AND PARABOLIC COORDINATES TO THE RAILING EDGE BOUNDARY LAYER,
by Arnold Goldburg and Sin-I Cheng. Apr 60, 20p AER-519
Contract AF49 638 465, Proj. 9781
AFOSR TN60 650; PB 152 738

Unclassified report

Descriptors: (*Boundary layer, Mathematical analysis), (*Numerical methods and procedures, Fluid mechanics), Fluid flow, Flat plate models, Wake, Differential equations, Superaerodynamics.

The application of the Poincare-Lighthill-Kud (PLK) method to the leading edge of a flat plate predicted the well known optimum parabolic coordinate system for boundary layer analysis. The coordinate system applicable to the trailing edge problem as predicted by the PLK method is found to differ from the conventional parabolic boundary layer coordinates by an order of magnitude. (Author)

AD-606 262 Div. 9
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A SIMPLE RELATIONSHIP BETWEEN THE SHOCK AND EXPANSION PRESSURE COEFFICIENTS AS A BASIS FOR STUDYING TWO-DIMENSIONAL HYPERSONIC FLOW,
by J. L. Raymond. 15 Jan 57, 64p P-1011

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hypersonic flow, Aerodynamic characteristics), Two-dimensional flow, Aerodynamic configurations, Mathematical analysis, Shock (Mechanics), Force (Mechanics), Pressure, Airfoils.

A simple relation between the two-dimensional wedge pressure coefficients for shock and expansion is shown to apply for the entire hypersonic regime. As a consequence, the hypersonic small-disturbance theory expressions for these coefficients are further simplified as are calculations of pressure distributions on arbitrary two-dimensional configurations at hypersonic speeds. (Author)

AD-606 280 Div. 9, 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
VIBRATION OF A WING OF FINITE SPAN IN SUPERSONIC FLOW,
by M. D. Khaskind and S. V. Fal'kovich. 11 Dec 63, 15p
FTD MT63 132; TT 64 71460

Unclassified report

Kolebaniya Kryla Konechnogo Razmakha v Sverkhzvukovom Potoke, edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1947, v. 11, no. 3, p. 371-376.
A portion of the original document contains fine detail which may make reading of photocopy difficult.

equation. The only simplifying assumption made is that the gas is one-dimensional: its particles all move in one direction. A finite difference method is proposed, tilizing the fact that for sufficiently small time intervals, the gas experiences essentially free molecular flow, so that the collision effects can be treated as a first order correction. The conservation laws are not used. The computed results generalize the classical solution: the computed solution agrees excellently with the classical solution, but in addition, has shock structure, diffusion of the contact discontinuity, and dispersion of the expansion wave, all incorporated. The same procedure is used to calculate steady state shock structure, to which the shock developed in the shock tube is compared. (Author)

AD-606 535 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE HIGH SPEED FLOW OF GAS AROUND BLUNT BODIES,
by Hyman Serbin. 11 Sep 57, 40p P-1172
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gas flow, Blunt bodies), (*Blunt bodies, Gas flow), Disks, Spheres, Density, Shock (Mechanics), Specific heat, Velocity, Hypersonic flow, Supersonic flow, Drag, Aerodynamic heating, Mathematical analysis.

A number of results derived on the flow of air around blunt bodies moving at high speed are presented in a unified analysis. The theory predicts in a satisfactory way the shock shape and detachment distance for two blunt bodies, a flat disk, and a sphere. It is shown that the density ratio across a normal shock is a useful parameter combining the effects of both the free stream Mach number and the ratio of specific heats. (Author)

AD-606 545 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THIN AIRFOILS IN HYPERSONIC FLOW WITH STRONG SHOCKS,
by Joseph L. Raymond. 19 Dec 57, 26p P-1189
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Airfoils, Hypersonic characteristics), (*Hypersonic flow, Shock waves), Convex bodies, Wedges, Two-dimensional flow, Force (Mechanics), Angle of attack, Drag, Lift.

The expression for normal force is derived in closed form for the case of hypersonic flow with strong shocks, a logical extension of the isentropic case carried out by Dorrance and by Linnell in the regime $0.1 < \text{or} = K < \text{or} = 10$. The method is especially useful in applications to convex airfoils with continually varying slope whenever the profile can arbitrarily be defined as $y = f(x)$. In this case the closed form solution eliminates the 'piecemeal' tangent-wedge type of approximation which is inherently laborious and limited in accuracy. The expression is derived from a simple relation between the two-dimensional pressure coefficients for shocks and expansion flows. Although this relationship is based on small-disturbance theory the force calculations appear to agree with 'exact' shock-expansion theory and with experiment to angles of attack of 25 degrees, hence is anomalous to a certain extent. (Author)

AD-606 622 Div. 9
OTS Prices: None/MF $0.50

RAND Corp., Santa Monica, Calif.
LIFT OF SLENDER NOSE SHAPES ACCORDING TO NEWTONIAN THEORY,
by J. D. Cole. 4 Feb 58, 20p P-1270
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Document is available in Microfiche only.

Descriptors: (*Slender bodies, Lift), (*Lift, Slender bodies), (*Bodies of revolution, Angle of attack), Hypersonic flow, Fluid dynamic properties, Perturbation, Theory, Iterative methods.

AD-606 626 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTE ON THE LIFT OF SLENDER NOSE SHAPES ACCORDING TO NEWTONIAN THEORY,
by J. D. Cole. 24 Jan 58, 4p P-1276
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Slender bodies, Lift), (*Lift, Slender bodies), (*Bodies of revolution, Angle of attack), Hypersonic flow, Fluid dynamic properties, Perturbation theory, Iterative methods.

AD-606 662 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
THE SLOW VISCOUS FLOW OF AN INCOMPRESSIBLE FLUID THROUGH A CONSTRICTION,
by F. Edward Ehlers. Aug 64, 17p
D1 82 0367, Boeing-Math-361
Unclassified report

Also available from the author.

Descriptors: (*Fluid flow, Viscosity), (*Lubricants, Fluid flow), Incompressible flow, Laminar flow, Pressure, Parabolic bodies, Integrals.

An approximate solution is given for the slow viscous flow of an incompressible fluid through a constricting channel consisting of one straight and one curved wall. The flow is assumed to be laminar and the pressure to be constant throughout each cross section. The inertial terms in the momentum equations are neglected in comparison with the viscous friction terms. Specific formulae are given for the volumetric rate of flow through a channel whose curved wall is either a parabolic or a circular arc. Graphs of the dimensionless volumetric rate of flow for a practical range of the geometric parameters are also included. (Author)

AD-606 668 Div. 9, 12
OTS Prices: HC $3.00/MF $0.75

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
NITROGEN INJECTION INTO THE BASE REGION OF A HYPERSONIC WAKE,
by Robert T. Herzog. 15 Aug 64, 98p GALCIT-M-71
Contract DA31 124ARO D33
AROD 1600 68
Unclassified report

Using a relaxation type model to describe the intermolecular collisions, the problem is reduced to the solution of two coupled non-linear integral equations for the density and temperature of the gas. An analytic solution of these equations is obtained for the limiting case of very high plate temperature ratio. Numerical results are obtained for several temperature ratios, the lowest being 4 to 1, and for a state of rarefaction varying from free molecular to the transition regime. The numerical results are compared with results of a moment method, using four moments, and a first iterate method. The results of this moment method are found to be insufficiently sensitive to variations in the plate temperature ratio. Through use of a modified rarefaction parameter the numerical results for temperature ratios of 16 and 4 to 1 correlate quite well with the results of linearized analyses using more than four moments. (Author)

AD-606 424 Div. 9
OTS Prices: HC $1.00/MF $0.50

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
HYPERSONIC RESEARCH PROJECT.
Quarterly status rept. no. 19, 1 Apr-1 Jul 60,
1 Jul 60, 13p
Contract DA04 495ORD1960
Unclassified report

Descriptors: (*Hypersonic flow, Scientific research), Viscosity, Slender bodies, Heat transfer, Shock tubes, Wake, Boundary layer, Electric discharges.

AD-606 426 Div. 9
OTS Prices: HC $4.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
DYNAMICS OF FLUIDS IN MOVING CONTAINERS,
by Jack E. Brooks. 9 Feb 59, 115p STL/GM-04.4-26
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sloshing, Dynamics), (*Containers, Fluid dynamic properties), Motion, Moments, Oscillation, Surface properties, Fluid flow, Functional analysis, Equations, Propellant tanks.

Contents:
Kinematics for a moving coordinate system; Functional representations; Summary of basic hydrodynamic relations; Hydrodynamic equations for the moving system; Equivalent solid for fluid system; Free surface conditions; Eigenvalue problem and sloshing modes; Small oscillation sloshing; Fluid forces and moments; Energy considerations; Equivalent mass-spring system.

AD-606 468 Div. 9
OTS Prices: HC $1.00/MF $0.50

Heat Transfer Lab., Univ. of Minn., Minneapolis.
EFFECT OF BUOYANCY FORCES ON MASS TRANSFER COOLING.
Technical rept. no. 25,
by R. Eichhorn. Feb 60, 10p
Contract AF18 600 1226
AFOSR TN60 64; PB 149 083 canceled
Unclassified report

Descriptors: (*Laminar boundary layer, Heat transfer), (*Aerodynamic heating, Control), (*Heat transfer, Laminar boundary layer), Cooling, Ablation, Surface properties, Fluid dynamic properties, Mathematical analysis, Friction, Buoyancy, Temperature, Velocity, Differential equations, Convection.

Consideration is given to the constant property laminar boundary layer equations with free convection and mass transfer. It is shown that similar solutions are possible for blowing rate distributions varying as the distance from the leading edge raised to the power (n-1)/4 where n is the exponent in a power law surface temperature distribution. Solutions to the equations in the form of skin friction and heat transfer parameters, and velocity and temperature profiles are presented for the constant wall temperature case for a fluid with Pr = 0.73. The cases considered range from strong suction to strong blowing. Mass transfer has a pronounced effect on the heat transfer but only a slight effect on the skin friction. In light of the solutions presented these effects are shown to be physically rational. (Author)

AD-606 472 Div. 9
OTS Prices: HC $2.00/MF $0.50

Aerodynamic Lab., Ohio State Univ. Research Foundation, Columbus.
PRESSURES ON THE BLUNT PLATE WING AT SUPERSONIC AND HYPERSONIC SPEEDS,
by John D. Lee. Jul 64, 36p
Contract AF33 657 10416, Proj. 1426, Task 142604
FDL TDR64 102
Unclassified report

Descriptors: (*Blunt bodies, Aerodynamic loading), (*Swept wings, Aerodynamic loading), Pressure, Supersonic flow, Hypersonic flow, Surfaces, Load distribution, Two-dimensional flow, Delta wings, Angle of attack, Cylindrical bodies, Enthalpy, Aerodynamic characteristics, Numerical methods and procedures, Shock (Mechanics), Mathematical analysis.

Over wide ranges in Mach number, sweep angle and attack angle, simple adjusted forms of Newtonian, Prandtl-Meyer, and blast wave theories may be used to accurately predict the pressure distributions on blunt-edged flat plates, including the leading edge regions. On the leading edge, Newtonian-Prandtl-Meyer flow may be adjusted with an empirical factor to fit available experimental data. For the plate surface, the blast wave equation is modified by matching to the pressures at the cylinder-plate junction and on the infinite wedge, corresponding to the proper sweep and attack angle. (Author)

AD-606 511 Div. 9
OTS Prices: None/MF $0.50

Plasma Lab., Columbia Univ., New York.
A KINETIC-THEORETIC DESCRIPTION OF THE FORMATION OF A SHOCK WAVE.
Rept. no. 11,
by C. K. Chu. Jun 64, 55p
Contract AF49 638 1254; Grant NSF G24351
NP 14186
Unclassified report

Document is available in microfiche only.

Descriptors: (*Shock waves, Kinetic theory), Shock tubes, Adiabatic gas flow, One-dimensional flow, Superaerodynamics, Difference equations.

The classical Riemann problem--the flow of a gas in a shock tube--is treated in the context of kinetic theory as an initial value problem for the one-dimensional Krook

SOLITARY WAVES IN COMPRESSIBLE MEDIA,
by M. C. Shen. Jul 64, 105p IMM-NYU-325
Contract Nonr285 55; Grant NSF GP1669
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Compressible flow, Mathematical analysis), Boundary layer, Nonlinear systems, Linear systems, Surfaces, Equations.

Solitary waves in compressible media of finite depth and infinite depth are studied. The critical speeds are first obtained from the linearized equations and then confirmed by the results of the nonlinear theory. Explicit expressions for the solitary waves are established by a perturbation scheme applied to the nonlinear equations. The case of a polytropic compressible medium of finite depth at rest in the state of equilibrium is studied. Solitary waves in compressible medium of infinite depth are investigated. The former concerns two isothermal layers at rest in the state of equilibrium separated by a contact surface; the latter, an isothermal layer with non-uniform velocity distribution at equilibrium. It is found that solitary waves vanish at certain values of characteristic parameters introduced in each case, and especially no solitary wave solution exists for an isothermal layer of infinite depth. (Author)

AD-606 798 Div. 9
OTS Prices: HC $2.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
STUDY OF FLOW INDUCED IN VISCOELASTIC LIQUID BY A ROTATING CONE,
by W. H. Hoppmann, II and C. N. Baronet. Oct 64, 29p
Contract Nonr591 20
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Viscoelasticity, Fluid flow), (*Flow visualization, Viscoelasticity), Alkenes, Polymers, Conical bodies, Dyes, Photographic analysis, Torque, Thrust, Vortices.

As part of an intensive effort to determine the proper equations for the motion induced in a viscoelastic liquid by a rotating cone, an extensive series of photographs of lines of flow were obtained. The liquid studied was polyisobutylene dissolved in cetane. The flow visualization was obtained by means of a dye which was injected into the liquid in a systematic manner. The photographic study was made for cones of vertex angles 110 and 160 degrees. Some visual observations were also made in the case of a cone of vertex angle 176 degrees. Measurements of both torque and thrust were made on each of the three cones at various angular velocities. (Author)

AD-606 864 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SWEEPBACK THEORY FOR SHOCK WAVES AT HYPERSONIC SPEEDS,
by J. D. Cole. 4 Apr 58, 8p P-1337
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shockwaves, Aerodynamic characteristics), (*Swept-back wings, Gas flow), Hypersonic flow, Wedges, Lift, Delta wings, Deflection, Pressure, Density.

The report presents the results of hypersonic small-deflection theory for the pressure coefficient, density, and other characteristics behind the shock wave on a sweptback wedge. The results have application to computation of the pressure on sweptback wings of wedge cross-section outside the region of influence of the tips. They can also be used to estimate the lift of a flat delta wing flying at very high speeds. In addition, the behavior of the shock waves deduced here is the first step in computing non-uniform flow fields behind the shock wave.

Rept. on Proj. DEFENDER.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Wake, Hypersonic flow), (*Nitrogen, Injection), Geometric forms, Cylindrical bodies, Reynolds number, Boundary layer, Hypersonic wind tunnels, Reentry vehicles, Guided missiles, Schlieren photography, Control, Statistical analysis.

An experimental investigation was made of the changes occurring in the near wake of a cylinder at M = 6.0 when nitrogen was injected into the base region. The free stream Reynolds number based on cylinder diameter was 30,000 and the rate of injection was varied from zero to 3 percent of the frontal area free stream mass flow. Pitot pressure profiles across the wake, Schlieren photographs and measurement of the boundary layer separation point on the cylinder were used to define the changes in wake geometry. Static pressure and temperature surveys were made along the wake centerline starting at the base of the cylinder and continuing downstream to X/D = 6.0. The injection reduced the recompression in the neck region and left only a slight insentropic compression in place of the strong wake shock. The recirculation of mass in the base-region was eliminated with approximately 1.5 percent injection. An automated hot wire recording system which produced data suitable for computer reduction was developed and used to measure temperature. (Author)

AD-606 739 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF HEAT EXCHANGE IN ROUND PIPES DURING SUPERSONIC GAS FLOW,
by V. M. Polyaev and S. V. Belov. 28 May 64, 16p
FTD MT64 58; TT 64 71484

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Mashinostroenie (USSR) 1963, no. 5, p. 92-99.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Heat transfer, Pipes), (*Supersonic flow, Heat transfer), Gas flow, Thermodynamics, USSR.

The article gives results of experimental investigation of heat exchange in round pipe during supersonic flow of gas and gives comparison of experimental data with results of calculation by existing criterial dependences. It established that coefficient of heat transfer in round pipes at low values of temperature factor and M numbers to 2.7 can be determined. (Author)

AD-606 749 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF OUTFLOW OF A BOILING LIQUID THROUGH A CENTRIFUGAL INJECTOR NOZZLE,
by V. A. Makhin, V. F. Prisnyakov and I. F. Tokar'.
21 May 64, 13p
FTD MT63 295; TT 64 71491

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Aviatsionnaya Tekhnika (USSR) 1962, v. 5, no. 4, p. 139-144.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Injectors, Nozzles), (*Nozzles, Fluid flow), Liquids, Boiling, Centrifugal fields, Vapors, Films, Vortices, Water, Kerosene, Nitric acid, Nitrogen compounds, Oxides, USSR.

AD-606 754 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HIGH-SPEED AND THERMAL BOUNDARY LAYER ON AN AXIALLY SYMMETRIC BODY, ROTATING IN UNLIMITED MOTIONLESS MEDIUM AND ON MOTION OF A SHOCK WAVE DURING NONINSTANTANEOUS OPENING OF DIAPHRAGM IN SHOCK TUBE,
by L. A. Dorfman and V. T. Kireev. 7 Jan 64, 20p
FTD MT63 90; TT 64 71494

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1962, no. 6, p. 144-146.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Boundary layer, Heat transfer), (*Shock waves, Acceleration), (*Mechanics, Mechanical engineering), Incompressible flow, Rotation, Polynomials, Turbulent boundary layer, Fluid flow, Laminar boundary layer, Bodies of revolution, Shock tubes, Velocity, Gas flow, Diaphragms (Mechanics), Numerical methods and procedures, USSR.

AD-606 758 Div. 9
OTS Prices: HC $4.00/MF $1.00

Stanford Univ., Calif. Div. of Engineering Mechanics.
A LITERATURE REVIEW ON SUBSONIC FREE TURBULENT SHEAR FLOW,
by R. M. Halleen. Apr 64, 132p MD-11
Contract AF49 638 1278
AFOSR 5444

Unclassified report

Descriptors: (*Subsonic flow, Shear stresses), (*Turbulence, Fluid flow), Axially symmetric flow, Two-dimensional flow, Three-dimensional flow, Wake, Jets, Partial differential equations.

Solutions, for both two-dimensional flow and three-dimensional axially symmetric flow, are reviewed for the three major free turbulent shear flow topics: the turbulent shear layer, the turbulent wake, and the turbulent jet. Several models for the turbulent shear stress were used in some of these solutions. The solutions are compiled in consistent nomenclature and compared. For each of the three topics, the defining partial differential equations for the particular turbulent shear stress models and geometric conditions are given, followed by the transformation of the variables utilized in obtaining a solvable differential equation. Finally, the solution is presented. Experimental mean velocity profile data for each condition are correlated and reduced to a single curve using the least squares curve fitting technique. A table of coordinates for each curve is given, including the standard deviation from the mean. Other experimental information is also tabulated. (Author)

AD-606 792 Div. 9
OTS Prices: HC $4.00/MF $0.75

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.

MECHANISM OF MICROBIOLOGICAL CONTAMINATION OF JET FUEL AND DEVELOPMENT OF TECHNIQUES FOR DETECTION OF MICROBIOLOGICAL CONTAMINATION. Quarterly progress rept. no. 3, 1 Sep-1 Dec 63, by Gordon C. Blanchard. 1 Dec 63, 168p Contract AF33 657 9186

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Jet engine fuels, Biological contamination), (*Fuel contamination, Microorganisms), Fuel systems, Carboxylic ester hydrolases, Oxygen, Carbon dioxide, Electrophoresis, Polarization, Corrosion, Nitrates, Sulfates, Aluminum, Culture media, Copper, Permeability, Solubility.

This study is concerned with the detection of microorganisms in fuel water-environments and with the mechanisms by which these microorganisms cause problems in fuel systems of aircraft. The laboratory detection methods studied were the esterase approach, tetrazolium reduction, O2 consumption and CO2 evolution. The techniques which appear to have the greatest chance of success are the esterase approach and tetrazolium reduction. For field detection, the work is continuing on the electrophoresis-pulse polarization technique. These studies have been extremely successful in finding techniques which should be useful for rapidly detecting small numbers of viable microorganisms in fuel water bottoms. The esterase technique now can detect viable cells in about 5 minutes and it is expected that the tetrazolium technique will determine the number of organisms which can utilize fuel. All that remains to be done now is to establish the criteria, such as the length of time required for color to develop, which will indicate when the microbial contamination has reached a harmful level.

11. Ground Transportation Equipment

No Entries

10. Fuels and Combustion

AD-606 238 Div. 10, 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
EXPERIMENTAL INVESTIGATION OF SLOSHING.
Semi-annual rept. for 1 Jul-31 Dec 58,
by J. P. O'Neill. 31 Dec 58, 24p STL/GM-TR-0165-00582
Contract AF04 647 165

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sloshing, Propellants), Guided missiles, Theory, Control, Damping, Spacecraft, Rings.

The report covers the entire program to date on a laboratory investigation to obtain experimental information necessary for evaluation of current slosh-baffle designs and for verification and extension of existing theory on sloshing phenomena and control. A detailed understanding of propellant sloshing phenomena will permit rational design changes, if required, on Atlas, Titan and Thor, and will contribute toward the design of minimum-weight slosh control in future ballistic missiles and space exploration systems. The measurements for the principal objective of the original program plan (165-11) were completed. The data provided experimental verification of the currently-used theory for the forces on slosh-damping rings and resulted in an extension of the range of application of the theory. Other phases of the study resulted in a reassessment of areas now considered of primary importance and warranting further experimental investigation. (Author)

AD-606 281 Div. 10, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AERODYNAMIC CHARACTERISTICS OF A FLAME ON OUTLET FROM BURNERS WITH TANGENTIAL BLADE AIR FEED,
by R. B. Akhmedov. 9 Jan 64, 22p
FTD MT63 193; TT 64 71461

Unclassified report

Edited machine trans. of Teploenergetika (USSR) 1963, v. 10, no. 1, p. 28-33. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Flames, Aerodynamic characteristics), Gas flow, Combustion, Instrumentation, USSR.

AD-606 570 Div. 10, 4
OTS Prices: HC $3.00/MF $0.75

Texaco Research Center, Beacon, N. Y.
RESEARCH ON THERMAL EFFECTS ON FUELS ATTRIBUTABLE TO STORAGE.
Technical documentary rept. for May 63-Apr 64,
by J. J. Bialy, T. A. Norris, and F. P. Frascati.
Jul 64, 67p
Contract AF33 657 10746, Proj. 3048, Task 304801
APL TDR64 83

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Fuels, Thermal properties), (*Storage, Aviation fuels), Environmental tests, Test equipment, Samplers, Oxygen, Nitrogen, Chromatographic analysis, Solubility, Stability, Jet engine fuels, Supersonic flight.

Texaco Research Coker was modified to a more dynamic system, to both approach the test conditions used in various fuel test rigs, such as the CRC rig, and to simulate actual mission profiles for different supersonic aircraft. The modifications included vacuum system for the fuel reservoir, cold finger device and sampling port for fuel sampling. A series of shakedown runs have been completed using the modified test aggregate. Analytical phase of the program entailed development of sampling method and determination of dissolved oxygen and nitrogen gases in fuel at the ppm range. (Author)

AD-606 751 Div. 10, 22
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT THE MECHANISM OF COMBUSTION OF POWDERS,
by P. F. Pokhil and V. M. Mal'tsev. 30 Mar 64, 15p
FTD MT63 242; TT 64 71493

Unclassified report

Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1963, v. 6, no. 6, p. 94-99.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nitroglycerin, Combustion), (*RDX, Combustion), (*Combustion, Powders), Flames, Physical properties, USSR.

Experimental data are listed for the study of the main physical properties of a flame of solid fuel -- nitroglycerine powder and explosive hexogene during combustion in a bomb of constant pressure. (Author)

AD-606 770 Div. 10, 9
OTS Prices: HC $3.00/MF $0.50

Gas Dynamics Lab., Princeton Univ., N. J.
A CRITICAL EXAMINATION OF THE FLUID DYNAMIC PROBLEM POSED BY THE LAMINAR JET DIFFUSION FLAME,
by Arnold Goldburg and Sin-I Cheng. Jul 64, 56p
AER-702
Contract AF49 638 1271
AFOSR 64 1595

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Jet flames, Laminar flow), (*Jet mixing flow, Diffusion), Combustion, Fuels, Oxidizers, Oxygen, Alkenes, Fluid dynamic properties.

The paper discusses the laminar diffusion flame: a combustion process which occurs in a region which is located in the mixing zone between the undiluted fuel and the undiluted oxidizer and in which the mixing is carried out by molecular diffusion only. The boundary layer similar solutions are presented for the relevant distributions of the physical properties and species concentrations in a planar laminar jet diffusion flame.

AD-606 771 Div. 10, 16
OTS Prices: HC $5.00/MF $1.00

Melpar, Inc., Falls Church, Va.

FLUID FLYWHEEL ATTITUDE CONTROL SYSTEM STUDIES,
by D. J. Griep. 17 Aug 64, 54p TOR-269(4540-70)-5
Contract AF04 695 269

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Attitude control systems, Spacecraft), (*Spacecraft, Attitude control systems), Flywheels, Fluids, Liquid metals, Mercury, Moment of inertia, Torque, Electromagnetic pumps, Magnet, Electric fields, Magnetic fields, Momentum, Mathematical analysis.

A single-axis attitude control system using a fluid flywheel as the torque-producing element is analyzed. The control laws that are either analyzed or derived are: (1) proportional control, (2) minimum orientation time control, and (3) minimum electrical-power consumption control. Pontryagin's Maximum Principle was used to derive the latter two control laws. Experimental laboratory data are presented for the proportional control system. The smooth, low-velocity performance obtained using a fluid flywheel is demonstrated. (Author)

AD-606 331 Div. 12, 1[illegible]
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SECRET WEAPONS OF THE SOVIET UNION,
by Volursus. Feb 54, 10p T-33
TT 64 71465

Unclassified report

Trans. of Flug-welt (West Germany) 1953, v. 2, Nov, p. 349-353.

Descriptors: (*Guided missiles, USSR), (*USSR, Guided missiles), Rockets, Nuclear weapons, Launching sites, Underwater rockets, Scientific research, Industries, Industrial production.

Information on Soviet secret weapons is presented. Topics include: (1) Guiding apparatus for missiles, (2) V-1 and V-2 rockets, (3) German-Soviet collaboration, (4) M-1 and M-100 missiles, (5) rocket research institutes, (6) plants for the production of rockets, and (7) new Soviet launching sites threatening Europe and the United States.

AD-606 332 Div. 12, 25, 30
OTS Prices: HC $3.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
EFFECTS OF SUPPORT CONDITIONS AND SHAKER ARRANGEMENTS IN BEAM VIBRATION TESTING,
by H. E. Lindberg. 16 Dec 58, 55p
STL-GM-TR-0165-00533, STL-EM-8-24

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Beams (Structural), Vibration), (*Damping, Automatic pilots), Guided missiles, Simulation, Structural properties, Mathematical analysis, Analog computers, Mechanics.

The motion of a uniform beam is studied directly and with the aid of an analog computer, in order to determine the effects of support damping in terms of an approximate per cent of critical damping in each mode. The computer is used to determine the range of support damping for which velocity coupling can be neglected in calculating the damping in the constrained modes. Curves are also presented giving the relative amplitudes of the first few constrained modes and the first few free-free modes plotted as a function of shaker position for three 'soft-mounted' conditions. Similar curves are given for an actual missile. Recommendations are made concerning procedures to be used when ground-testing a missile for the damping in each of its free-free modes. (Author)

AD-606 338 Div. 12, 15, 19
OTS Prices: HC $4.00/MF $1.00

Army Missile Command, Redstone Arsenal, Ala.
SATELLITE TECHNOLOGY AND SPACE NAVIGATION,
by Harry O. Ruppe. 9 Sep 58, 141p
AMC-RA DSP TN9 58

Unclassified report

Paper prepared for presentation at the Missile Technology Course of the Institute on Missile and Rocket Technology, Univ. of Conn., 21 Sep-3 Oct 58. Legibility of this document is in part unsatisfactory. Document is available in Microfiche only.

Descriptors: (*Astronautics, Mathematical analysis), (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Mathematical analysis), (*Space navigation, Mathematical analysis), Numerical methods and procedures, Celestial mechanics, N-body problem, Gravity, Terrestrial magnetism, Life expectancy, Spacecraft, Rockets, Launching, Soft landings, Space communication systems, Ascent trajectories, Atmosphere entry, Equations, Theory.

This study concerns physical fundamentals of orbit mechanics and satellite technology. The astronomical two-body problem is treated and the results applied to the case of artificial satellites. Some effects of special interest to artificial satellites are treated in some detail, eg. lifetime, interaction with Earth magnetic field. A short survey on rocket theory is given, including step rockets, and some ascend problems are examined. Fundamentals of the theory of the low-acceleration vehicles are included. Jacobi's integral is derived to give an impression on the difficulties and possibilities of the three-body problem. Some of the questions of landing on a celestial body, communication and navigation in space and uses of space vehicles are shortly covered. In a few cases, interesting optimization problems are mentioned.

AD-606 423 Div. 12, 2
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
THE RADIATION ENVIRONMENT IN THE INTERIOR OF A SPACE VEHICLE (GEOMAGNETICALLY TRAPPED RADIATION AND INTERPLANETARY COSMIC FLUX),
by Alan Rosen. Nov 60, 61p STL/TN-60-0000-02196

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space environmental conditions, Cosmic rays), (*Radiation hazards, Shielding), (*Shielding, Spacecraft), Terrestrial magnetism, Aurorae, Van Allen radiation belt, Radiation effects, Solar flares, Materials, Metals, Thickness, Degradation, Geiger counters, Bremsstrahlung, Geophysics.

The purpose of this article is to summarize the characteristics of the penetrating radiation likely to be found in

12. Guided Missiles

AD-606 221 Div. 12
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
A DIGITAL COMPUTER PROGRAM FOR A GENERALIZED INERTIAL GUIDANCE SYSTEM ERROR ANALYSIS,
by R. A. Moore and D. F. Meronek. 30 Mar 59, 58p
STL/TR-59-0000-00647

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inertial guidance, Errors), Instrumentation, Corrections, Programming (Computers), Guided missiles.

This paper considers the equations relating errors in inertial guidance system measurement instruments to errors in missile burnout position and velocity and consequently to target misses. The relationship is expressed in terms of three linear differential equations with trajectory-dependent coefficients and forcing functions which depend on the measurement instrument errors. The forcing functions are presented in forms sufficiently general to accomodate errors that might arise in widely different types of instruments, both accelerometers and gyroscopes. Furthermore, the forcing functions can be evaluated for arbitrary instrument orientations. Programmed on a digital computer, these equations allow swift computation of target misses for given component tolerances and component orientation and consequently facilitate the optimization of instrument orientation. Such a program has been used extensively by the authors for gyro orientation schemes and general error studies for a number of ballistic missile inertial guidance systems. (Author)

AD-606 248 Div. 12, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE APPLICATION OF THE KALMAN FILTER TO SOME ASTRODYNAMICAL PROBLEMS,
by F. T. Smith. Sep 64, 44p RM-4277-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Astronautics, Dynamic programming), (*Dynamic programming, Astronautics), (*Satellites (Artificial), Trajectories), Orbital trajectories, Rendezvous trajectories, Position finding, Errors, Corrections, Least squares method.

This Memorandum applies dynamic programming to the derivation of the computational equations for a Kalman filter. The problem of using a set of ill-conditioned observations is considered. For example, when observations of a satellite taken from a single ground station are spaced too close together in time, the accuracy of the determination of the satellite's orbital parameters is poor. Such a set of observations is said to be ill-conditioned. The general set of computational equations derived is interpreted in terms of an orbit determination problem, an orbit correction process, and a satellite rendezvous problem. (Author)

AD-606 250 Div. 12
OTS Prices: HC $8.30/MF $2.25

North American Aviation, Inc., Downey, Calif.

TEMPERATURE CONTROL SYSTEMS FOR SPACE VEHICLES,
by C. P. Bacha, F. I. Honea, and D. Watanabe.
6 Apr 62, 530p SID-62-335
Contract AF33 616 8323, Proj. 6146, Task 61118
ASD 62 P1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Temperature control, Spacecraft), (*Spacecraft, Temperature control), Thermal radiation, Heat transfer, Thermodynamics, Equations, Tables, Control systems.

Passive, semi-passive, active and heat storage methods for temperature control are described, which include mathematical equations, tables and graphs. Comparison between the various methods are made indicating their advantages and disadvantages. A section is presented on thermal design consideration of space vehicle equipment indicating various means for controlling equipment temperature. Methods of thermal analysis and examples of analyses are presented which include steady-state and transient heat transfer. A brief discussion on dynamic response is also included. Conclusions are reached concerning advances in analysis and design techniques. Recommendations cover areas needing investigation and further studies. (Author)

AD-606 282 Div. 12
OTS Prices: HC $4.00/MF $1.00

Boeing Co., Seattle, Wash.
INVESTIGATION OF SELF-ALIGNING MOUNTINGS FOR SPACE OPERATION.
Final rept. for 1 Mar 63- 1 Mar 64,
by F. Schenk and J. W. Van Wyk. Mar 64, 141p
Contract AF33 657 10422, Proj. 1315, Task 131501
FDL TDR64 47

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mounting brackets, Bearings), (*Spacecraft, Bearings), Lubricants, Ball bearings, Antifriction bearings, Atmosphere entry, Aluminum compounds, Oxides, Alignment, Air, Vacuum, Tests.

A study phase and an experimental test program are described for investigation of self-aligning bearing mountings in air and ultra-high vacuum from -100F to 2500F. Eleven self-aligning mounting concepts plus sixteen variations in concept configurations were evaluated in the study phase. Two different concepts, 'an antifriction ball' and 'a multiple lubricant ring', were selected for test and evaluation in a Phase II test program. A study was conducted throughout the program to select lubricants for operation in air and vacuum from -100F to 2500F. Test fixtures were designed and fabricated to permit evaluation of mounting performance under simulated space and re-entry environments. Mountings fabricated from aluminum oxide were subjected to alignment-misalignment cycling in air from -100F to 1500F and in a vacuum from 0F to 1500F. Minimum pressure obtained in vacuum tests was less than 5 x 10 to the minus 11th power Torr. Successful operation was obtained in air at -100F and in an ultra-high vacuum from 0F to 1500F with a radial load of 2500 pounds. Conclusions and recommendations for further investigations are presented. (Author)

AD-606 316 Div. 12, 19
OTS Prices: HC $3.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.

Descriptors: (*Manned spacecraft, Maintenance), (*Checkout equipment, Manned spacecraft), Redundant components, Modules (Electronics), Spare parts, Switching circuits, Lunar craft, Design, Space crews, Spacecraft cabins, Humidity, Space environmental conditions, Weight, Automation.

The focus of this paper is on maintenance and checkout system concepts for manned space vehicles. Currently, there are two primary maintenance concepts typified as (a) modular design and in-flight repair, and (b) redundancy and switching; these are described and the factors relating to their applicability discussed. Checkout system concepts compatible with both maintenance approaches are similarly treated. The operational domains of interest are the in-flight and lunar mission phases of the next set of manned space missions - typified by those of Gemini and Apollo. The discussions are not, however, specific to this spacecraft. The two mission phases are discussed separately. (Author)

AD-606 619 Div. 12, 2
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BASIC OBJECTIVES OF A CONTINUING PROGRAM OF SCIENTIFIC RESEARCH IN OUTER SPACE,
by W. W. Kellogg. Nov 57, rev. 16 Jan 58, 44p
P-1259
Unclassified report

Prepared for the National Academy of Sciences for the Earth Satellite Program.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space flight, Scientific research), (*Space environmental conditions, Scientific research), (*Astronautics, Scientific research), Sounding rockets, Atmospheric sounding, Upper atmosphere, Lunar probes, Lunar environment, Interplanetary trajectories, Meteorological satellites, Space probes, Scientific satellites, Mars probes, Venus probes, Manned spacecraft, Space biology, Spacecraft, Astrophysics.

AD-606 688 Div. 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC-PHYSICAL TRADE-OFFS IN SCHEDULING MISSILE SYSTEM CHECKOUTS,
by M. Kamins. Mar 62, 26p P-2567
Unclassified report

Descriptors: (*Checkout equipment, Weapon systems), (*Costs, Checkout equipment), Guided missiles, Performance (Engineering), Maintenance, Automatic.

This paper is concerned with a portion of RAND's study of automatic checkout equipment, which was initiated late in 1958 at the request of the Air Force. The project objective was . . . to establish the basic philosophy, concepts, and parameters for application of automatic test and checkout equipment to improve the operational readiness and employment of weapon systems. The primary activity then was to develop concepts, design methods and techniques, and decision aids to help make these test equipments and systems more effective--in short, to help make the best use of test equipment dollars to get the best weapon system performance.

AD-606 816 Div. 12, 19, 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
SIMPLIFIED BENDING ANALYSIS FOR GYROS AT DIFFERENT STATIONS,
by Louis F. Lanzer. 22 Jan 58, 5p GM-42.4-39
Unclassified report

Descriptors: (*Gyroscopes, Mechanics), Dynamics, Functions, Equations, Navigation, Guidance, Guided missiles.

Autopilot equations for different forms of the bending slope detected by the gyros as a function of their individual positions are presented.

AD-606 820 Div. 12
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
DETERMINATION OF ANGLE-OF-ATTACK FROM ANGULAR RATES: KINEMATIC SOLUTION,
by Denis Brasket. 31 Mar 59, 27p RAD-9-TM-59-24
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reentry vehicles, Angle of attack), (*Angle of attack, Determination), Euler's angles, Rotation, Oscillation, Gravity, Equations, Mathematical analysis.

The time history of the angle-of-attack for a re-entry vehicle is determined from knowledge of the angular rates about the body axes. The method presented utilizes Eulerian angle relationships between a moving set of body axes and a set of axes fixed with respect to inertial space. These equations are integrated to yield data defining the history of the rotational motion of the vehicle. A numerical filter is applied to this data to separate the motion due to the vehicle aerodynamic oscillation from the motion due to gravity and from the fictitious motion due to drift in the process of integration. (Author)

AD-606 822 Div. 12
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ERROR ANALYSIS OF KEPLERIAN TRAJECTORIES,
by E. C. Levy. 15 Jun 59, 46p STL/TR-59-0000-00723
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Astronautics, Trajectories), (*Trajectories, Satellites (Artificial), (*Satellites (Artificial), Trajectories), Free flight trajectories, Errors, Analysis, Equations, Graphics.

When designing a satellite vehicle it is usually necessary to be able to predict the behavior of the vehicle in the face of minor deviations in the dynamic and kinematic parameters. The prime reasons for this are: (a) to determine whether or not the possible changes in the course of the vehicle will hamper its usefulness for the intended mission, and (b) to determine which are the most critical parameters and thereby endeavor to design the vehicle system so that

the extraterrestrial environment and to consider the attenuation of the radiation by shielding which may reasonably be expected to make up the wall surface of a spacecraft. The first section of this report deals with the characteristics of the radiation in various regions of space. The trapped radiation zones have only recently been discovered and the experimental evidence bearing on the spatial distribution and characteristics of the trapped particles is rather voluminous. This experimental evidence has been relegated to the third section, in order that the first section be as succinct as possible. In essence then the first section is a summary of the characteristics of radiation present in space, based on the experimental evidence presented in the third section.

AD-606 474 Div. 12
OTS Prices: HC $1.00/MF $0.50

Norair Div., Northrop Corp., Hawthorne, Calif.
SATELLITE INTERCEPTION,
by G. S. Gedeon. Apr 60, 15p ASRL-TM-60-1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Satellites (Artificial), Interception), (*Interception, Satellites (Artificial)), Intercept trajectories, Orbital trajectories, Interceptor spacecraft, Numerical methods and procedures, Geometry, Series, Power series.

To intercept an orbiting target by another satellite implies, that the two vehicles must arrive simultaneously to the same point in space. In the following a calculation procedure is presented for solving this coincidence problem. To facilitate the calculation of the unknown semi major axis of the interceptor's orbit, Lambert's Equation is rewritten in form of a power series which can be evaluated by a convenient differential correction technique instead of the usual trial and error method. (Author)

AD-606 568 Div. 12, 9, 15
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
A MODEL FOR THE ERRORS IN SATELLITE ORBITAL PREDICTIONS CAUSED BY FLUCTUATIONS IN DRAG,
by Kenneth Mee. 27 Apr 60, 43p
STL/TR-60-0000-09145
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Orbital trajectories, Satellites (Artifical)), (*Mathematical prediction, Orbital trajectories), Errors, Drag, Perturbation theory, Numerical analysis, Graphics, Model theory, Geophysics, Solar flares.

By smoothing satellite observations, Jacchia discovered a variation in satellite drag which is correlated with solar radiation at 10 to 20 centimeters, and is quasi-periodic with a period of 27 days; however, this variation cannot account for the erratic nature of the errors in satellite orbital predictions. Nonweiler and Jacchia have both found a correlation of drag with solar flares; but their calculations are smoothed over 10 to 30 periods, so the behavior from period to period is unknown. The following model has been devised to describe the erratic behavior of the errors. It is assumed that there are three sources of error in satellite orbital predictions: observational error, the sinusoidal variation, and a random fluctuation. The model for the random drag fluctuations is arrived at in the following way: The fluctuations are assumed to be independent from period to period, because many of the geophysical effects of solar flares last from a few minutes to an hour. The root mean square value of the random fluctuation at a perigee height of 120 miles is calculated from some smoothed data on Sputnik II published by Nonweiler, by using the assumption of independence. It is then extended to other altitudes by assuming that the rms value of the random fluctuation is proportional to the amplitude of the sinusodidal variation, which was determined by Jacchia to be 10 per cent for the Russian satellites and 35 per cent for Vanguard I. The sinusoidal amplitude is here taken to vary linearly with the height of perigee.

AD-606 569 Div. 12, 14
OTS Prices: HC $6.00/MF $1.25

Cook Electric Co., Morton Grove, Ill.
STUDY AND EXPLORATORY FREE-FLIGHT INVESTIGATION OF DEPLOYABLE AERODYNAMIC DECELERATORS OPERATING AT HIGH ALTITUDES AND AT HIGH MACH NUMBERS,
by W. E. Nickel and L. W. Sims. Jul 64, 209p
Contracts AF33 657 8423, continuation of AF33 616 7016, Proj. 6065, Task 606505
FDL TDR64 35 V1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Parachutes, Reentry vehicles), (*Reentry vehicles, Parachutes), (*Parachute descents, Supersonic characteristics), Parachute fabrics, Atmosphere entry, Aerodynamic heating, Deceleration, High altitude, Heat-resistant materials, Stainless steel, Telemetry, Oscillation, Temperature, Reynolds number, Wind tunnel models, Heat transfer coefficients, Free flight trajectories, Stresses, Environmental tests.

Thirteen parachute decelerator tests were performed at the Gulf Test Range of the Air Proving Ground Center at Eglin Air Force Base, Florida. These tests were accomplished through the use of multistage rocket boosters. The Cree payload vehicle was used as the test platform and data gathering system. These tests were conducted using both Hyperflo and Hemisflo parachutes which were deployed at predetermined Mach number-altitude regimes. Tests were accomplished over a Mach number range of 0.2 to 4.4 and an altitude range of 45,000 to 190,000 feet. The data presented includes drag coefficients versus Mach number, dynamic pressure, Reynolds number and velocity, canopy angles of oscillation, canopy temperatures and general design considerations. From this parachute decelerator test program, it may be concluded that Perlon mesh roof Hyperflo parachutes perform satisfactorily through Mach 2.1, that Nomex ribbon Hyperflo parachutes perform satisfactorily through Mach 4.0 and that Nomex Hemisflo parachutes perform satisfactorily through Mach 3.4. (Author)

AD-606 580 Div. 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CURRENT CONCEPTS AND ISSUES OF IN-SPACE SUPPORT,
by Sidney I. Firstman. Aug 64, 12p P-2966
Unclassified report

Prepared for publication in the 1964 Space/Aeronautics R and D Handbook.

13. Installations and Construction

AD-606 208 Div. 13, 14
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
FIELD TESTS OF WATER-REDUCING, SET-RETARDING ADMIXTURES IN MASS CONCRETE AT GLEN CANYON AND FLAMING GORGE DAMS: - COLORADO RIVER STORAGE PROJECT,
by J. D. Richards. 15 Jun 64, 32p C-1108
Unclassified report

A portion of the original document contains fine detail which may make reading photocopy difficult.

Descriptors: (*Dams, Concrete), (*Concrete, Reinforcing materials), Environmental tests, Water supplies, Compressive properties, Elasticity, Creep, Mixtures, Cements, Lignin, Costs, Additives, Civil engineering, Colorado.

Tests were conducted at Glen Canyon and Flaming Gorge Dams to determine any advantages to be gained through the use of lingnin-type, water-reducing, set-retarding agents/WRA/ in mass concrete. At both projects a control mix with normal cementitious-material content was compared to mixes in which the cementitious-material content was reduced 5 to 10 percent or the cobble content was reduced 10 percent with the use of a WRA. Conclusions were-- (1) The 180-day compressive strength of concretes containing a WRA was 20 to 26 percent greater than the control concretes. In some cases the 1-day strength of the WRA concretes was less than the control concrete. (2) With a 5 percent reduction in cement plus pozzolan content the WRA reduced the water requirement 5.4 percent at Flaming Gorge and 10.9 percent at Glen Canyon. (3) The addition of a WRA produced a 3- to 9-hour increase in time to reach initial set in mortar. (4) Use of the WRA did not increase the rate of slump and air loss in the concretes. (Author)

AD-606 209 Div. 13, 14
OTS Prices: HC $1.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
QUARRY TILE IS SATISFACTORY FOR POWERPLANT AND PUMPING PLANT FLOORS,
by B. J. Brink. 31 Jul 64, 23p C-1111
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Power plants (Establishments), Floors), (*Floors, Power plants (Establishments)), Materials, Bonding, Compressive properties, Tensile properties, Shear stresses, Wear resistance, Impact shock, Shock resistance.

A variety of tests were performed on quarry tile, portland cement-sand mortar setting bed, and jointing mortar to determine the suitability of these materials for use in principal floors of two large pumping-generating plants on San Luis, Central Valley Project. Four test panels were fabricated from materials similar to those likely to be used. Specimens core drilled from panels were tested in tension and compression. Shear bond strength was tested in accordance with Federal Specification SS-T-308b. Other tests performed included abrasion, impact resistance, and stain and discoloration tests using oil, grease, acid, and wax. Test results, together with consultations with representatives from the tile manufacturing and tile setting industry, indicate that quarry tile installed by methods approved by the tile industry should provide a suitable floor for pumping-generating plants. The report contains nine conclusions based principally on results of laboratory tests. (Author)

AD-606 212 Div. 13
OTS Prices: HC $3.00/MF $0.75

Bureau of Reclamation, Denver, Colo.
INVESTIGATIONS OF A PLASTIC REINJECTABLE GROUT VALVE FOR USE IN BUREAU STRUCTURES,
by J. R. Graham. 1 Jun 64, 93p C-1100
Unclassified repo

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plug valves, Tests), Plastics, Cements, Reinforced concrete, Construction, Structures, Dams, Pressure.

A laboratory investigation was conducted to determine the operational characteristics of a plastic reinjectable grout valve and determine its applicability for use in future Bureau structures. Large heavily reinforced concrete blocks were fabricated with the grout valves embedded adjacent to one edge then bolted together to form a joint comparable to those found between blocks of a dam. Tests were conducted by pumping cement grouts with different water to cement ratios into the variable width joint between blocks. Grout valve conditions also were varied. Results of tests indicated that operation of this valve is somewhat unpredictable with regard to the pressures needed to open it and its resealing capabilities. A thin layer of original grout frequently remained between the rubber plug and the conical plastic fitting causing secondary opening and resealing to be more difficult and inconsistent. The grout valve was modified with a strap over the rubber plug portion and resulted in a more consistent operation and one independent of the joint opening.

AD-606 213 Div. 13, 26
OTS Prices: HC $3.00/MF $0.75

Bureau of Reclamation, Denver, Colo.
RESEARCH STUDIES ON HYDRAULIC DOWNPULL FORCES ON LARGE GATES WITH SPECIAL APPLICATION TO THE SAN LUIS OUTLET WORKS EMERGENCY GATES.
Progress rept. no. 1,
by R. I. Murray and W. P. Simmons. 31 Mar 64, 80p Hyd-530
Unclassified repor

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hydraulic systems, Dams), Gate valves, Design, Operation, Hydraulic models, Seals (Stoppers), Pressure.

General studies were made to determine design parameters for hydraulic downpull and uplift forces on downstream seal, roller-mounted gates located in entrance transitions of large conduits. Effects of various gate lip extensions, and recesses in the gate shaft, were investigated for one seal extension. Uplift forces great enough to prevent closure of gates under their own weight were found. Uplift forces were controlled by proper shaping of offsets and recesses in the face of the gate shaft or bonnet. A gate lip extension to leaf thickness ratio of 0.55 was selected as the optimum compromise between structural and hydraulic considerations. Pressures on the gate bottoms, and hence the downpull, were significantly affected by the gate slots and side walls. Effects of air admission were also determined.

its dependency upon these parameters is reduced. For the sake of completeness, and also to avoid misinterpretations, some space has been allotted in this report to the outline of some of the fundamental equations describing satellite orbits. Since only the vehicle's characteristics from the end of its powered flight to the point where it begins to trace its undisturbed orbit are considered, the method of launching is immaterial to the discussion. In all cases, the results presented herein apply only to a two-dimensional trajectory. Hence, a great deal of care should be exercised in extrapolating these results to the three-dimensional case. (Author)

AD-606 857 Div. 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN INTRODUCTION TO GUIDED MISSILES,
by J. M. Chester. 4 Apr 58, 14p P-1327
Unclassified report

Prepared for presentation at Providence High School Parents' Guild, Burbank, Calif., 16 May 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Guided missiles, Reviews), Guidance, Design, Operation, Space flight, Electronic equipment, Radar, Launching.

AD-606 862 Div. 12, 2
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
SPACE VEHICLE ENVIRONMENT,
by C. Gazley, Jr., W. W. Kellogg, and E. H. Vestine.
7 Jul 58, rev. 15 Jun 59, 64p P-1335
Unclassified report

Presented at the National Summer Meeting of the Institute of Aeronautical Sciences, Los Angeles, 8-11 Jul 58.

Descriptors: (*Spacecraft, Space environmental conditions), (*Space environmental conditions, Spacecraft). Space flight, Thermal radiation, Solar radiation, Temperature, Terrestrial magnetism, Magnetic fields, Cosmic rays, Meteorites, Meteors.

The purpose of the report is to estimate and discuss various physical space attributes of the natural environment in the solar system. In particular the discussion will be concerned with a cursory survey of the characteristics of solar radiations, the effects of solar and other thermal radiations on vehicle temperature, the characteristics of the earth's magnetic fields and other magnetic fields in space, the earth's exosphere and the solar corona, cosmic rays, and meteoroids. Estimates of the probability of space vehicle skin penetration by meteoroids are also presented. (Author)

economic design of structures that are made of ductile materials and have to carry specified loads. From the mathematical point of view, the problem can be reduced to one in linear programming, but even simple structures may lead to linear programming problems of considerable size. A method of solution is discussed that was found efficient for structures of moderate complexity. A sketch of the historical development of limit analysis and design is given. (Author)

AD-606 499 Div. 13, 14
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
FLOW RESISTANCE COEFFICIENTS OF THREE SIZES OF CAST-IN-PLACE CONCRETE PIPE,
by C. E. Brockway. 27 Aug 64, 47p Hyd-533
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pipes, Installation), (*Hydraulic pressure, Pipes), (*Concrete, Pipes), Fluid flow, Casting, Boundary layer, Equations, Test methods, Surface properties.

Hydraulic resistance coefficients were determined from head loss measurements made in 48-, 42-, and 36-inch-diameter cast-in-place concrete pipe installations. Data were obtained with the pipes flowing full at discharges less than the design values; from about 10 cubic feet per second to 25 cubic feet per second. Pipe test reaches varied from 1,240 to 3,895 feet. The hydraulic grade line was measured in 10-inch-diameter air vents used as piezometers; discharges were measured using a rectangular weir. Sufficient data were obtained to calculate flow resistance coefficients using the Darcy-Weisbach, Manning, and Scobey equations. The flow resistance coefficients for the 48- and 42-inch pipe and one reach of 36-inch pipe may contain residual losses produced by pipe entrance flow patterns, but the resistance coefficients for one reach of 36-inch pipe are believed to be representative of the values to be expected in long straight reaches. (Author)

AD-606 500 Div. 13
OTS Prices: HC $3.00/MF $0.75

Bureau of Reclamation, Denver, Colo.
STRUCTURAL BEHAVIOR ANALYSIS OF MONTICELLO DAM FOR THE PERIOD SEPTEMBER 1955 TO SEPTEMBER 1963.
by Louis H. Roehm and Keith Jones. Sep 64, 92p
BR-D TM662
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dams, California), Construction, Theodolites, Stresses, Deflection, Strain (Mechanics), Compressive properties, Tensile properties, Temperature, Deformation, Foundations (Structures), Concrete, Surveying, Cooling, Equations, Structural properties.

Strain meter clusters, no-stress strain meter pairs and resistance thermometers were embedded in the concrete of Monticello Dam during construction. At about the time of completion of the dam, three plumblines were suspended from approximately the crest to the foundation of the dam in 10-inch diameter wells formed in the concrete. Twenty-three triangulation targets were mounted in a grid pattern on the downstream face of the dam and two piers for mounting a theodolite to measure movements of the targets were provided on the canyon walls downstream from the dam. Periodic readings of the three systems of measurement were continued from September 1955 to September 1963 and the readings reduced to stresses and deflections which are significant in the analysis of the structural behavior of the dam. Results show a maximum compressive stress of 500 psi. Small, transient tensile stresses occurred only during early ages of the concrete. Deflections of the crest of the dam show a close relationship to climatic temperature variations. A small, continued increase in downstream deflections is evident and has been attributed to permanent deformation of the foundation rock. (Author)

AD-606 502 Div. 13, 9
OTS Prices: HC $2.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
WAVE FORCES ON PILING,
by A. D. K. Laird. Jun 64, 46p HPS-64-1
Contract NBy32233
Unclassified report

Descriptors: (*Cylindrical bodies, Fluid dynamic properties), (*Supports, Fluid dynamic properties), (*Water waves, Cylindrical bodies), Piers, Harbors, Model tests, Force (Mechanics), Drag, Lift, Moments.

The object of the research program was to gather a representative body of data on various groups of cylinders subjected to simulated wave action with a vien to providing information relative to the behavior of docks, dolphins or other marine and harbor structures of similar configuration in waves of various heights and periods. The main body of data was taken by an inverted model study in which the horizontal component of the orbital motion of the water caused by wave action was simulated by moving vertical groups of cylinders through otherwise still water in a rectilinear oscillatory motion parallel to the water surface. The forces measured were principally drag, lift (transverse force) and moment of the group about a vertical central axis. Correlations of the data for the various groups were sought with emphasis on the validity of modelling the waves by Froudes law and the force coefficients by Reynolds law. (Author)

AD-606 685 Div. 13, 2
OTS Prices: HC $3.00/MF $0.75

New Mexico Univ., Albuquerque.
THE RESPONSE OF BURIED CYLINDERS TO QUASI-STATIC OVERPRESSURES,
by B. A. Donnellan. Sep 64, 98p
Contract AF29 601 6002, Proj. 1080, Task 108005
WL TDR64 13
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Underground structures, Geophysics), (*Cylindrical bodies, Aluminum), (*Shelters, Scientific research), Dynamics, Tests, Pressure, Statics, Stiffened cylinders, Buckling (Mechanics), Flexible structures, Experimental data, Structures, Soils.

An experimental investigation was conducted into the response of small buried aluminum cylinders to quasi-static overpressures. The cylinders were buried with their axes horizontal in dense, dry, 20-30 Ottawa sand. Cylinders of two stiffnesses were tested at depths ranging from zero to two cylinder diameters. Their

AD-606 229 Div. 13
OTS Prices: HC $8.30/MF $2.25

Bureau of Reclamation, Denver, Colo.
ANALYSES AND DESCRIPTIONS OF CAPACITY TESTS IN LARGE CONCRETE-LINED CANALS,
by Paul J. Tilp and Mansil W. Scrivner. Apr 64, 530p
BR-D TM661
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inland waterways, Concrete), (*Fluid dynamic properties, Inland waterways), Performance (Engineering), Fluid flow, Reynolds number, Drag, Algae, Design, Geometric forms, Herbicides, Experimental data.

Betwwen 1957 and 1962, the Bureau of Reclamation made tests to determine flow capacities and resistance coefficients in 9 large concrete-lined irrigation canals. Tests were made on some 170 miles of trapezoidal-shaped canals having flows which varied from 555 cfs to 6,820 cfs. Design discharges for test canals varied from 700 to 13,200 cfs. Head loss measurements were made across piers and inverted siphons. Test data were analyzed in terms of 'n' values for Manning's formula and on Reynolds' Number - friction factor plots. Resistance coefficients varied with the amount of aquatic growths, canal alinement, and canal size. Manning's 'n' generally varied from 0.013 to 0.016 for the smaller canals and from 0.015 to 0.019 for the larger canals. Aquatic growths were found in varying amounts on lining surfaces of all canals and caused seasonal variation in flow resistance. Biweekly copper sulfate treatments retarded the most prevalent growth, filamentous algae. A hydraulic design procedure for concrete-lined canals is outlined.

AD-606 294 Div. 13
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FEATHER RIVER WATER FOR SOUTHERN CALIFORNIA,
by James C. DeHaven and Jack Hirshleifer.
20 Feb 57, 31p P-1034-RC
Unclassified report

Descriptors: (*Water supplies, California), (*California, Water supplies), Rivers, Costs, Floods, Control, Economics, Irrigation systems, Industries, Dams, Construction, Equations.

The purpose of this paper is to estimate the role which water supply from the Feather River Project should play, if rational economic considerations governed, in the calculations of Southern California. It is suggested that the responsible Southern California authorities should insist on a similar report before deciding whether they are willing to bear--or rather, have their constituents bear--the additional cost required to enlarge the Project to allow deliveries to Southern California.

AD-606 329 Div. 13, 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FORCES INDUCED BY BREAKING WAVES ON A VERTICAL WALL,
by J. J. Leendertse. Jan 62, 50p P-2512
Unclassified report

This paper was prepared for presentation at the American Society of Civil Engineers Convention in Houston, Texas, held on 19-23 Feb 62. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Breakdown, Model tests), (*Civil engineering, Breakwaters), (*Hydrology, Breakwaters), Water waves, Structures, Hydraulic models, Physics laboratories, Tests.

Analyses are presented of two-dimensional laboratory measurements of the forces induced by breaking waves on a vertical barrier placed on a plane with a one-to-ten slope. The deepwater wave heights ranged from 0.2 to 0.6 foot and their periods ranged from 1.9 to 3.3 seconds. The ratio between the depth of water in front of the barrier and the deepwater wave length was approximately 0.0115. The forces on the barrier in this study are usually characterized by a peak, which occurs immediately after the initial impact. The impulse of the peak is usually a small percentage of the cumulative impulse up to the time of momentum reversal. After this short-duration peak, the force decreases exponentially until after an appreciable part of the wave period - about one-sixth, depending on the wave steepness - when it rises again to a (second) maximum which occurs at the time of momentum reversal. This maximum in the force is approximately equal to the average force from the time of initial impact to the time of this maximum of rise (momentum reversal). (Author)

AD-606 445 Div. 13, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LINEAR PROGRAMMING AND STRUCTURAL DESIGN. I. LIMIT ANALYSIS,
by William Prager. 26 Jun 57, 18p P-1122
Unclassified report

Descriptors: (*Linear programming, Loading (Mechanics)), (*Structures, Loading (Mechanics)), (*Loading (Mechanics), Linear programming), Ductility, Structural properties, Mathematical analysis, Design.

'Limit Analysis' provides the structural engineer with a realistic estimate of the load carrying capacities of structures that are made of ductile materials. From the mathematical point of view, the problem of limit analysis is one of linear programming. The basic concepts are presented and a practical method of solution is discussed. This is essentially the 'simplex method with prices,' but the various steps are given mechanical interpretations which enable the experienced analyst to capitalize on his intuitive understanding of structural behavior. (Author)

AD-606 446 Div. 13, 15, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LINEAR PROGRAMMING AND STRUCTURAL DESIGN; II: LIMIT DESIGN,
by William Prager. 11 Jul 57, 30p P-1123
Unclassified report

Lecture delivered at RAND Corp., Santa Monica, Calif., 11 Jul 57, see also AD-606 445.

Descriptors: (*Linear programming, Loading (Mechanics)), (*Structures, Loading (Mechanics)), (*Loading (Mechanics), Linear programming), Beams (Structural), Structural properties, Ductility, Mathematical analysis, Design.

'Limit Design' guides the structural engineer towards an

FIRE SAFETY TRAINING AND SPEAKERS DIRECTORY.
Jan 64, 43p

Unclassified report

Limited supply on hand; when exhausted, document will be available in microfiche only.

Descriptors: (*United States government, Fire safety), (*Fire safety, Training), (*Government employees, Training), Management engineering, Personnel management, Education, Radiation hazards, Fires, Fire extinguishers, Fire alarm systems, Fire pumps, Hazards, Civil defense, Disasters, Industries.

The Government Employees Training Act (Public Law 85-507) makes available to practically every Federal agency a management tool which, properly used, can help significantly to increase efficiency and effectiveness of operations. It places responsibility for training squarely on the head of the agency who is not only authorized but directed to establish needed training programs. Each agency covered by the Act is authorized, subject to certain requirements of law and regulation, (1) to establish, or strengthen, needed inservice training programs; (2) to send its employees to training programs conducted by other Government agencies, to the extent those agencies are able to accept them, and to admit to its own programs employees from other agencies with or without reimbursement; (3) to send its employees to non-Government facilities for needed training which is not reasonably available within Government, and to pay all or any part of the expenses of such training; (4) to pay expenses of employees attending meetings that will contribute to better supervision and management of its substantive functions, as well as meetings concerned with the substantive functions themselves; (5) to permit its employees to accept training contributions and awards from non-Government sources; and (6) to permit is employees to accept payment from outsiders for certain expenses connected with meetings which they attend.

AD-606 722 Div. 13, 8
OTS Prices: HC $2.00/MF$0.50

Federal Fire Council, Washington, D. C.
FIRE PROTECTION FOR ESSENTIAL ELECTRONIC EQUIPMENT.
Recommended practices.
Mar 62, 38p RP-1

Unclassified report

Descriptors: (*Fire safety, Electronic equipment), (*Electronic equipment, Fire safety), Storage, Design, Hazards, Heat-resistant materials, Sprinklers, Fire alarm systems, Fire extinguishers, Specifications.

AD-606 724 Div. 13
OTS Prices: HC $2.00/MF$0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE EXPERIENCE FOR FISCAL YEAR 1960.
1960, 31p

Unclassified report

Descriptors: (*Fires, United States), United States government, Damage, Hazards, Fire alarm systems, Sprinklers, Costs, Aircraft fires, Statistical data, Fire safety, Buildings, Costs.

From the past can be gained knowledge to assist in successfully shaping the future. This is especially true when the knowledge is integrated into planning--a recognized management concept that is a requisite for program success. With this thought in mind, certain conclusions have been set forth below to summarize the statistics and information contained in this report. These conclusions should not be considered as a complete evaluation of this material. Each agency is encouraged to review the information to identify the applicability of the fire safety problems and loss experience contained herein to its own particular operations. Further, each agency is encouraged to recognize the need for review of its own fire loss experience for additional significant items.

AD-606 725 Div. 13
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE EXPERIENCE FOR FISCAL YEAR 1961.
1961, 34p

Unclassified report

Descriptors: (*Fires, United States), United States government, Damage, Hazards, Fire safety, Wounds and injuries, Buildings, Aircraft fires, Aerospace craft, Fire alarm systems, Electronic equipment.

The number of fire fatalities, fire injuries, and property wastage from fire, all showed significant increases for Fiscal Year 1961 over Fiscal Year 1960. Much of this increase, particularly in property damage, can be attributed to one single fire. The increase in fire fatalities and injuries are more directly attributable to the improved reporting of fire losses by the Federal agencies to the Council. For instance, this report includes, for the first time, injuries and deaths occurring from aerospace vehicle fires. And again, this report includes for the first time, Bureau of Employees' Compensation figures on injuries and deaths from fire. Please note however, that only those BEC injuries and deaths not reported by the Federal agencies were included in the grand total to avoid duplication.

AD-606 726 Div. 13
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE EXPERIENCE FOR FISCAL YEAR 1962.
1962, 31p

Unclassified report

Descriptors: (*Fires, United States), United States government, Damage, Hazards, Fire alarm systems, Fire safety, Statistical data, Costs, Aerospace craft, Aircraft fires, Buildings.

This report continues the expanded Federal fire experience reporting base initiated in Fiscal Year 1960. Statistics are compiled on aerospace vehicles, buildings and contents, contractor operations, forests, shipboard and other categories. While the overall reporting of fire loss experience to the Council for Fiscal Year 1962 increased significantly over that for Fiscal Year 1961, there still remain some areas of fire loss experience that are not being covered. Several of the Federal agencies, including a few of the larger, do not have a clear picture of their annual fire losses due primarily to a lack of reporting procedure. The Council hopes this will be rectified in the future. Several fluctuations are evident in this report. The number of deaths and fires increased slightly--and the number of injuries and the total amount of loss decreased by about 22% and 30% respectively. Approximately 41% of the losses occurred in forests, grass, and tundra (includes cost of suppression); 30% in aerospace vehicles; 13% in buildings and contents;

behavior was evaluated quantitatively by radial displacement gages and tangential strain gages. Data at five overpressure levels up to 140 psi are presented. This maximum value exceeded the theoretical in-air primary buckling pressure of the cylinders by factors of 9.4 and 99. Destructive tests were conducted on noninstrumented cylinders of six stiffnesses. This maximum applied overpressure was 160 psi, 470 times the theoretical in-air primary buckling pressure of the most flexible cylinder. The overpressure required to cause collapse of the various cylinders was determined for as many depths of burial as the maximum overpressure would allow. The destructive tests demonstrate the great resistance to collapse imparted to a cylinder by burial. The nondestructive tests afford a comparison between the behavior of stiff and flexible cylinders as the depth of burial and the overpressure are changed. Two zones of burial, deep and shallow, are defined. (Author)

AD-606 717 Div. 13, 32
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
SALVAGING AND RESTORING RECORDS DAMAGED BY FIRE AND WATER.
Recommended practices.
Mar 63, 32p RP-2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Records, Fire safety), (*Fire safety, Records), (*Fires, Damage), Water, Damage, Hazards, Maps, Magnetic tape, Documentation, Driers (Apparatus).

This document describes several simple readily applied means of salvaging records damaged by fire and water. The methods can be performed without hard-to-acquire equipment or skilled labor. Elaborate technical methods of repair and rehabilitation of Archives or library material are not described here. Rather, the steps outlined are for those individuals who are called upon to restore office files for the immediate resumption of every day operations. For the restoration of intrinsically valuable materials, professional advice should be sought. Such advice can be obtained from libraries, historical societies, or representatives of the General Services Administration, National Archives and Records Service. The steps outlined in this report will, however, accomplish the necessary first aid measures until such time as professional remedial action can be taken. (Author)

AD-606 718 Div. 13, 8, 14
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF MEETING, FEBRUARY 16, 1960. INDUSTRY LOOKS AT FIRE PROTECTION FOR ELECTRONIC DATA PROCESSING INSTALLATIONS.
1960, 26p

Unclassified report

Descriptors: (*Symposia, Fire safety), (*Fire safety, Electronic equipment), (*Electronic equipment, Fire safety), United States government, Industries, Data processing systems, Installation, Fire-resistant coatings, Epoxy plastics, Sprinklers, Flammability, Fire extinguishers, Carbon dioxide, Fire alarm systems, Storage, Air conditioning equipment, Temperature warning systems.

AD-606 719 Div. 13, 1
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF ANNUAL MEETING, MAY 5, 1964.
1964, 32p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Fire safety), (*Fire safety, Commercial planes), (*Commercial planes, Fire safety), (*Aircraft fires, Fire safety), United States government, Hazards, Aviation safety, Fire extinguishers, Aviation fuels, Fuel systems, Flammability, Reports, Symposia.

For the first order of business, Chairman Daly called for action on the Annual Reports of the Committees of the Council. As the Reports had been prepublished and sent to all Federal Fire Council members prior to the Annual Meeting, Chairman Daly limited his remarks to a review of some of the highlights of Council activities for the past year as contained in these Reports. After this review Chairman Daly asked for a motion for adoption from the floor. A motion was made for acceptance and was seconded. By unanimous vote, the Reports were adopted as preprinted. Mr. Joseph Blatt, Director, Systems Research and Development Service, Federal Agency, discussed research and developments aspects of FAA's role in fire safety for commercial aviation. Commencing with a review of FAA's legal authority and responsibility for air safety of the public, Mr. Blatt then gave a short history of fire oriented studies associated with aviation. Following this, Mr. Blatt reviewed, in detail, fire safety studies presently underway in FAA and areas of proposed research and developments for the near future.

AD-606 720 Div. 13, 20,
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D.C.
FEDERAL FIRE COUNCIL MINUTES OF ANNUAL MEETING, MARCH 28, 1963.
1963, 36p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Fire Safety) (*Fire safety, Nuclear explosions), (*Nuclear explosions, Fire safety), United States government, Hazards, Urban areas, Thermal radiation, Disasters, Fire extinguishers, Models (Simulations), Buildings, Costs, Damage, Reports.

Colonel James H. Mangan, Deputy Chief of Staff for Operations, Defense Atomic Support Agency, discussed recent fire research and its possible impact on peacetime as well as wartime fire situations. The two general ways in which fires can originate in a nuclear explosion were explained. Colonel Mangan described DASA's research project to develop a comprehensive fire prediction system. The project is primarily an attempt to develop a reliable and practical methodology for integrating heat radiation from a nuclear burst and continuing through the possible ignition of building fires and their spread to other areas of a city.

AD-606 721 Div. 13, 23
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.

AD-606 732 Div. 13, 32
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF MEETING, NOVEMBER 6, 1963: STAFF PROGRAM MANAGEMENT AS RELATED TO FIRE SAFETY. THE COUNCIL'S FIRE SAFETY REFERENCE LIBRARY.
1964 32p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Fire safety), (*Fire safety, Information retrieval), (*Libraries, Fire safety), (*Management engineering, Fire safety), Personnel Research program administration, Articles, Reports, Subject indexing, Storage.

The purpose of the meeting was to discuss program management and the Council's library operations. Mr. Tom Creswell, Safety Officer for the Federal Aviation Agency, pointed out the problems that exist with staff programs--and ways of overcoming these weak points. He said that most staff groups probably grew from a lack of knowledge, or a lack of practical application of good recognized theories, on the part of line management or the operating people. Staff groups are responsible for building a system in which operating personnel must, and can, work efficiently and economically in accomplishing the organization's mission. The basic objective for the fire safety function was stated as evaluating the system in which operating people are working to identify weaknesses in the system and to call these weaknesses to the attention of the appropriate functional manager so that HE can take corrective action. Dick Bright, Assistant Staff Director Federal Fire Council explained the need, history, and present operations of the Council's fire safety reference library. He pointed out that fire safety features are scattered throughout a mountain of reports and articles, and, therefore, there is no fire safety reference library capable of performing all the vital indexing, abstracting, and retrieval services needed.

AD-606 733 Div. 13, 16
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF JOINT MEETING WITH FEDERAL SAFETY COUNCIL, MAY 17, 1962: PURPOSES, GOALS AND CURRENT PROGRAMS OF THE ACCIDENT PREVENTION DIVISION, PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION AND WELFARE.
1963 35p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fire safety, Symposia), (*Accidents, Inhibition), Wounds and injuries, Diseases, Aging (Physiology), Artificial respiration, United States government.

AD-606 777 Div. 13, 9
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE INFLUENCE OF DEPOSITS IN TUBES ON HYDRAULIC PRESSURE DROP,
by Wilhelm Wiederhold. 15 Sep 64, 30p
RSIC 269; TT 64 71481

Unclassified report

Trans. of GWF; das Gas- und Wasserfach (West Germany) 1949, v. 90, no. 24, p. 634-641.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fluid flow, Pipes), (*Pipes, Corrosion), Pressure, Pressure gages, Measurement, Water supplies, Hydrodynamics, West Germany.

In the first pressure section of the Ecker long-distance water pipeline, considerable decreases in the rate of flow occur in years of low operation which can be traced back to a special corrugation of the film of grease deposited in the system. The small depth of the deposit in relation to the pipe diameter and its technical flow behavior, different in nature from that of hitherto investigated roughnesses, make it probable that it is a matter of a new specific type of roughness. This discussion is preceded by a review of the general theory of flow in pipe lines.

8% in shipboard; and 8% in the other category. No graphs or charts are included in this report due to a lack of appropriate statistics on the expanded reporting base for previous years.

AD-606 727 Div. 13, 16, 23
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FIRE DEPARTMENT ACCIDENT ANALYSIS WATER TESTING, AND FIREFIGHTER SAFETY: A TRILOGY.
Jun 62, 47p

Unclassified report

Descriptors: (*Fire safety, Casualties), (*Hazards, Fire safety), (*Accidents, Fire safety), Wounds and injuries, Personnel, Burns, Drowning, Radiation hazards, Medical equipment, Medical personnel, Shock (Pathology), Anoxia, Gases, Toxicity, Artificial respiration, Sprinklers, Fire pumps, Water.

Injuries suffered by firemen are presented and analyzed. The organization and planning for the care of injured firemen is outlined from the time of injury to his return to duty. Certain conditions specific to fire-fighting are discussed with special reference to prevention and treatment. Included are injuries while sliding poles, auto accidents going to fires, collapses of buildings, chest injuries, explosions, back injuries, chemical trauma, exhaustion, pneumonic cardiac effects and exposure to ionizing radiation.

AD-606 728 Div. 13
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FIRE PREVENTION WEEK SUPPLEMENT.
Aug 63, 43p

Unclassified report

Descriptors: (*Fire safety, United States government), History, Fire extinguishers, Fire alarm systems, Sprinklers, Water supplies, Training, Research program administration, Damage, Costs, Maintenance.

Each year the President of the United States proclaims the week containing the anniversary date (October 9) of the 1871 Chicago fire as 'Fire Prevention Week.' Many organizations and individuals were involved in the establishment of a national observance of fire prevention activities. The purpose of the national observance is to direct everyone's attention to the large number of deaths and injuries and loss of property from fire.

AD-606 729 Div. 13
OTS Prices: HC $2.00/MF $0.50

Federal Fire Council, Washington, D. C.
FIRE SAFETY PROMOTION.
1961 48p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fire safety, United States), United States government, Fires, Hazards, Fire alarm systems, Training, Population, Education, Fire extinguishers.

In the field of fire safety the improvement of automatic fire detecting, extinguishing, and control equipment has progressed to a high level while there has been a decided lag in the area involving people. There exists a pressing need for the creation of a constant awareness of fire safety at all levels and for individual and group training. In other words, increased emphasis must be placed on promotion and education. This brochure has been prepared to assist Federal agencies in planning a year-around fire safety promotion program. The suggested activities have been tried by various organizations throughout the country and have generally proved successful. Fires are traceable either directly or indirectly to people and every fire, no matter how small, has a devastating potential. Therefore, fire safety programs need to be geared towards the elimination of fires with more emphasis on education and training of employees.

AD-606 730 Div. 13
OTS Prices: HC $3.00/MF $0.50

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF MEETING, NOVEMBER 28, 1962: NEW DEVELOPMENTS IN FIRE PROTECTION.
1963 54p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Fire safety), (*Fire safety, Research program administration), (*United States government, Fire safety), Government employees, Leadership, Training, Fire extinguishers, Sprinklers, Hazards, Flammability, Fuel tanks, Aviation safety, Aircraft fires, Fire-resistant coatings.

Mr. Robert T. Daly, the new Chairman of the Council, presented his ideas on a progressive program toward professionalism. Federal fire safety personnel have a responsibility not only to be adequate for their job, he said, but to be leaders in the field. Three speakers discussed subjects ranging from a proposed expanded Government research program to descriptions of work in progress at a leading private laboratory and an important military establishment.

AD-606 731 Div. 13, 14
OTS Prices: HC $3.00/MF $0.75

Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF MEETING, APRIL 17, 1962: VARIOUS SURFACE FLAME-SPREAD TEST METHODS FOR BUILDING FINISH MATERIALS.
[1963] 91p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fire safety, Reports), (*Flammability, Test methods), (*Symposia, Fire safety), Hazards, Construction, Buildings, Models (Simulations), Plywood, Fire-resistant coatings, Fire-resistant textiles, Isocyanate plastics, Styrene plastics, Metals, Flame propagation, Toxicity, Gases.

Chairman Karl E. Wallace called attention to the fact that architects, code organizations, structural engineers, and fire safety personnel have long used flame spread, smoke generation, and fuel contributed indices as tools to design safe buildings--but that the existing methods used to establish these indices are complicated and are possibly not as well understood as they should be. He explained that nationally recognized authorities had been assembled to discuss some of the various test procedures used by Federal agencies.

Wilmington, Mass.
AN ANALYSIS OF SOME OF THE PHYSICAL AND CHEMICAL PROPERTIES OF SILICA (SiO_2) OF IMPORTANCE IN ABLATION BEHAVIOR,
by Harold L. Schick. 27 Oct 58, reprint 21 Apr 61, 118p RAD-TR-2-58-6
Contract AF04 645 30

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Silicon compounds, Dioxides), (*Ablation, Silicon compounds), Physical properties, Chemical properties, Thermochemistry, Decomposition, Vaporization, Vapor pressure, Boiling, Chemical equilibrium, Heat, Absorption, Reentry vehicles, Nose cones, Heat shields.

The physical properties and thermochemistry of decomposition of SiO_2 at high temperatures was thoroughly reviewed and detailed calculations were made of thermodynamic properties of interest for re-entry vehicle applications. Available thermodynamic data indicate that the primary reaction involved in the vaporization of SiO_2 under neutral conditions is: SiO_2(Liquid) yields SiO_2(Gas) + 1/2 O_2(Gas). The vapor pressure relation corresponding to this equilibrium is given. A normal boiling point of 3085K is predicted from the relation. If other equilibria are considered, including formation of SiO_2(gas), dimer formation, and dissociation of oxygen, a more refined boiling point of 3070 ± 70K is obtained. This value was compared with data in the literature and is consistent with the most reliable data available. When SiO_2 is heated from room temperature to its boiling point and decomposed at that temperature, the total heat absorption is calculated to be 6650 Btu/lb. Many other physical properties of SiO_2 which are of interest for re-entry vehicle design purposes, were reviewed and are summarized in an appendix at the end of the report. (Author)

AD-606 247 Div. 14
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison, Wis.
RECOMMENDED TECHNIQUES FOR PHOTOGRAPHING LOG AND LUMBER CHARACTERISTICS.
Research note,
by Henry H. Haskell, R. O. Woodfin, Jr., and E. H. Bulgrin. Sep 64, 25p
FPL 062

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wood, Photographic analysis), (*Photographic analysis, Wood), Errors, Test methods, Standards.

A study was made of photographic techniques that are useful in illustrating defects and indications of defects in logs and lumber. The techniques described were found to be the best of all those studied, and include those for use under well-controlled photographic conditions in a laboratory and those for use in a sawmill yard where variable and less advantageous conditions prevail. This study will be of particular interest to persons who are developing or preparing log-grade training aids. (Author)

AD-606 330 Div. 14, 8, 26
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
LAMINATES FOR HIGH TEMPERATURE.
Monthly letter rept. no. 8,
by J. H. Freeman. 30 Apr 63, 8p
Contract AF33 657 9078

Unclassified report

Descriptors: (*Laminates, Heat-resistant plastics), (*Heat-resistant plastics, Laminates), (*Radomes, Laminated plastics), Aging (Materials), Viscosity, Polymers, Polyamide plastics, Aromatic compounds, Organic compounds, Materials, Glass textiles, Plasticity, Dielectrics.

An investigation was made of polymers to be used as dielectric materials in the fabrication of radomes in continuous service in air at 650F. The flexural strength of aromatic imide laminates containing pentaerylhritol and the viscosity behavior of BTDA polyimides were studied.

AD-606 340 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Monsanto Research Corp., Dayton, Ohio.
DEVELOPMENT OF FIRE-RESISTANT WATER BASE HYDRAULIC FLUID.
Bimonthly rept. no. 3, 1 Aug-30 Sep 64,
by E. S. Blake, G. F. Deebel, and G. A. Richardson. 30 Sep 64, 7p
Contract NObs90270

Unclassified report

See also AD-603 340.

Descriptors: (*Hydraulic fluids, Flammability), Organic phosphorus compounds, Phosphates, Alkali metal compounds, Synthesis (Chemistry), Halogens, Fire safety, Ignition, Lubricants, Solubility, Stability, Water, Specifications, Shipborne.

Several unsuccessful attempts were made to prepare alkali alkyl phosphates containing stabilized halogen for improved autogenous ignition temperature. (Author)

AD-606 343 Div. 14, 27
OTS Prices: HC $2.00/MF $0.50

Hercules Powder Co., Magna, Utah.
THE STRESS-STRAIN RELATIONS OF SPIRALLOY WITH FILAMENTS PARALLEL OR NORMAL TO THE APPLIED FORCE,
by Bernard W. Shaffer. 26 Jul 61, 37p
HPC-050-12-1-1
Contract AF04 647 243

Unclassified report

Descriptors: (*Composite materials, Filament wound construction), (*Filament wound construction, Composite materials), Strain (Mechanics), Plastics, Glass textiles, Tensile properties, Elasticity, Stresses, Mathematical analysis, Loading (Mechanics), Rocket components, Compressive properties.

Moduli of elasticity are derived from stress-strain relations for Spiralloy with windings either parallel or normal to the applied force. (Author)

AD-606 394 Div. 14, 30
OTS Prices: HC $2.00/MF $0.50

Alcor, Inc., San Antonio, Tex.
DEVELOPMENT OF HIGH TEMPERATURE DEPOSITION RIG FOR ADVANCED ENGINE LUBRICANTS.

14. Materials (Non-Metallic)

AD-606 152 Div. 14, 1
OTS Prices: HC $7.00/MF $1.50

Bloomingdale Rubber Co., Chester, Pa.
DEVELOPMENT OF STRUCTURAL ADHESIVES,
by H. C. Engel. 1952, 326p
Contract AF33 038 21669
Unclassified report

Papers presented at Air Force, Aircraft Industries Association Conference on Structural Adhesives for Metals and Sandwich Construction, 15-16 Dec 52, Engineers Club of Dayton, Dayton, Ohio. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Adhesives, Metals), (*Sandwich construction, Adhesives), (*Structural parts, Adhesives), Bonding, Airframes, Rotary blades (Rotary wings), Honeycomb cores, Expanded plastics, Ceramic materials, Silicone plastics, Heat-resistant plastics, Heat-resistant materials, Sandwich panels, Reports.

Contents: (A) Structural adhesives for metals; development of better adhesives; development of heat resistance adhesives; development of room temperature setting adhesives; recent investigations of metal-bonding adhesives; development of production processes and design criteria for metal adhesives; development of non-destructive inspection methods for adhesive bonded structures. (B) European papers; British developments in the field of structural adhesives and sandwich construction; French - application of metal-to-metal bonding in airplane structures; design, process and service requirements for adhesives to be used in rotor blades; adhesive bonded helicopter rotor baldes. (C) Sandwich constructions; core materials and sandwich construction; development of foamed metal; foamed-in-place plastic core material, metal faces; development of heat resistant plastic foam; development of low density ceramic core material; progress in the development of a heat resistant foamed-in-place low density silicone resin core material; development of high temperature resistant honeycomb core materials.

AD-606 183 Div. 14
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison Wis.
MANUFACTURE AND GENERAL CHARACTERISTICS OF FLAT PLYWOOD,
Aug 64, 18p
FPL 064
Unclassified report

Descriptors: (*Plywood, Processing), Wood, Sheets, Adhesives, Bonding, Aging (Materials), Finishes and finishing, Storage, Deformation, Moisture, Standards, Sandwich construction, Manufacturing methods.

Plywood is manufactured by bonding thin sheets of wood (veneers) together with adhesives in such a way that the mechanical and physical properties of the wood are redistributed. This manufacture of plywood requires special equipment, knowledge, and technique. Important steps in the process of making flat plywood are outlined here, as well as information on types and grades and some properties of plywood. The information is based upon observations of factory practice and upon extensive experiments at the Forest Products Laboratory. (Author)

AD-606 206 Div. 14
OTS Prices: HC $2.00/MF $0.50

Bureau of Reclamation, Denver, Colo.
MOISTURE ABSORPTION OF HOT-MELT COATINGS. Final rept.,
by C. E. Selander. 3 Jun 64, 34p ChE-11
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bituminous coatings, Moisture), Absorption (Physical), Performance (Engineering), Time, Protective treatments.

In order to understand the effects of certain properties of protective coating materials on corrosion protection, a study was made of these properties without the effects of corrosion present. The moisture absorption properties of various hot-melt coatings have been so investigated for periods up to 14-2/3 years. It was found that low penetration coal-tar enamel established the lowest absorption rate of the 11 materials tested. It was also found that after 5 years each material reached a stabilized moisture absorption rate. This report covers the performance of four materials remaining in test after 8 years of exposure. (Author)

AD-606 243 Div. 14, 26
OTS Prices: HC $6.00/MF $1.25

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
HIGH TEMPERATURE EXTRUSION LUBRICANTS. Final rept. for 1 Jul 62-15 Jun 64,
by Robert C. Haverstraw. Jul 64, 232p
Contract AF33 657 9141, Proj. 7 947
ML TDR64 256
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lubricants, Extrusion), (*Extrusion, Lubricants), Alloys, Steel, Molybdenum alloys, Titanium alloys, Magnesium compounds, Borates, Graphite, Water, Manganese compounds, Oxides, Silicon compounds, Glass, High temperature research, Sodium compounds, Fluorine compounds, Plastics, Chlorides, Fluorides, Sulfides, Films, Lubrication, Surface properties, Thermal insulation.

Superior metalworking lubricants have been developed and have proven capability for broad temperature range utilization during extrusion of difficult round and tee sections of aerospace alloys. Numerous experimental lubricant materials were initially evaluated by three laboratory screening tests. First, a 'lubricity' test was devised to measure the lubricating characteristics under conditions simulating those found in extrusion. Second, a 'reactivity' test determined the relative degree of surface reaction between billet materials and candidate lubricants. Third, an 'insulation' test measured comparative thermal insulation characteristics for all candidate lubricants which exhibited superior results in the lubricity test. More than 100 extrusion trials each were conducted with 4340 steel and molybdenum -0.5% titanium billets. Results from the extrusion trails have demonstrated that a mixture of magnesium metaborate and graphite in water promotes relatively low extrusion pressures and superior control of extrusion dimensions and surface finish. These results have further demonstrated that this new lubricant is equally applicable to extrusion of 4340 steel at 1800F and molybdenum -0.5% titanium alloy at 3500F. (Author)

AD-606 246 Div. 14, 4, 12
OTS Prices: HC $4.00/MF $0.75

Research and Advanced Development Div., AVCO Corp.,

materials and related technology, within a one year period ending 28 February 1964, have been listed, indexed by subject, and compiled by material, type of technical data, and military application. Over 600 papers from 19 conferences have been covered. Included are a bibliography and an author index. An analysis of technical conference trends is also presented. (Author)

AD-606 671 Div. 14, 8
OTS Prices: HC $1.00/MF$0.50

Stanford Research Inst., Menlo Park, Calif.
EVALUATION OF THERMAL SHOCK RESISTANCE IN POTENTIAL RADOME MATERIALS.
Progress rept. no. 3, 1 May-1 Sep 64,
by D. A. Brown. 1 Sep 64, 20p
Contract Nonr4213 00X, Proj. 4538

Unclassified report

Descriptors: (*Ceramic materials, Shock resistance), (*Radomes, Ceramic materials), (*Shock resistance, Ceramic materials), Aluminum compounds, Magnesium compounds, Oxides, Fracture (Mechanics), Thermal stresses, Heating, Tensile properties.

Comparison of cracking characteristics as functions of heat flux was completed for unnotched specimens (both 3/8 and 3/16 inch wall thickness) of the five materials under study. A distinct relative rating of each materials' ability to withstand thermal shock and thermal stresses was obtained. In addition, the results permitted a differentiation between the relative thermal shock-stress resistance of the two wall thicknesses investigated. (Author)

AD-606 767 Div. 14
OTS Prices: HC $3.00/MF $0.75

Forest Products Lab., Madison, Wis.
STRENGTH PROPERTIES OF REINFORCED PLASTIC LAMINATES AT ELEVATED TEMPERATURES (VIBRIN 135 RESIN AND 181-GARAN GLASS FABRIC),
by Kenneth H. Boller. Jun 64, 66p
Contract AF33 657 63 358, Proj. 7381, Task 738103
ML TDR64 167

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Laminated plastics, Mechanical properties), (*Glass textiles, Laminated plastics), Reinforcing materials, Polyester plastics, Heat-resistant plastics, Elasticity, Tensile properties, Compressive properties, Stresses, Deformation, Degradation, Temperature, Loading (Mechanics).

This report presents properties of a heat-resistant polyester laminate made of Vibrin 135 resin and 181 glass fabric with Garan finish. Data are presented in both tables and curves. In general, it is shown that strength properties decrease with increases in temperature. Strength drops with the first application of heat, but at a constant temperature of 300F., the exposed material has a tendency to maintain a constant strength for continued exposure. Continued exposure at 400F. and above, however, caused degradation and losses in strength. From curves and data presented, the effects of temperature between 80 and 1,000F. and of exposure periods between 0.05 hour and 1,000 hours on individual strength properties may be judged and interpreted separately.

AD-606 769 Div. 14
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison, Wis.
EFFECT OF PRE-CYCLE STRESSES ON FATIGUE LIFE OF PLASTIC LAMINATES REINFORCED WITH UNWOVEN FIBERS,
by Kenneth H. Boller. Jun 64, 42p
Contract AF33 657 63 358, Proj. 7381, Task 738103
ML TDR64 168

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Laminated plastics, Fatigue (Mechanics)), (*Glass textiles, Laminated plastics), Epoxy plastics, Stresses, Reinforcing materials, Tensile properties, Compressive properties.

The fatigue life of five types of plastic laminates, made of Scotchply epoxy resin and unwoven 'E' glass fibers, was measured at two stress levels after damage had been programed at either higher or lower stress levels. The laminates were made of three types of resin and two orientations of fibers: ±5°, and at 0 and 90 degrees to the principal axis. S-N curves are presented for these laminates from 1/4 cycle to 10 million cycles. Five replications of tests are presented to establish median fatigue lives at specific stress levels. The three specific stress levels were at approximately 40, 60, and 80 percent of their ultimate strength. In general, the results show that if these laminates are subjected to one or three cycles at the 80 percent level and then cycled to failure at the 40 or 60 percent level, the first cyclic stress does not significantly affect the fatigue life at the second stress level. Exceptions appear in the report. The results also show, for three of the five materials, that if these laminates are subjected to a program of cycles at the 40 percent stress level (equal to a small portion of their normal life) and then cycled to failure at the 60 percent stress level, the first cyclic stress significantly extends the fatigue life at the second stress level. For the other two of the five materials, the first cycles produced some damage but not a significant amount. (Author)

AD-606 787 Div. 14, 17, 20
OTS Prices: HC $2.00/None

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON MATERIALS: INFLUENCE OF NEUTRON IRRADIATION ON PROPERTIES OF STRUCTURAL MATERIALS AND LUMINESCENCE OF CRYSTAL QUARTZ SUBJECTED TO THE ACTION OF ULTRAVIOLET AND X-RAYS,
by N. F. Pravdyuk, A. D. Amaev, P. A. Platonov, S. V. Starodubtsev, and Sh. A. Vakhidov. 21 Sep 64, 46p
FTD MT64 267; TT 64 71480

Unclassified report

Edited machine trans. of mono. Deistvie Yadernykh Izluchenii na Materialy, Moscow, 1962, p. 34-57, 362-365. Legibility of this document is in part unsatisfactory. Limited supply on hand: when exhausted document will not be available.

Descriptors: (*Radiation damage, Materials), (*Neutron reactions, Radiation damage), (*Quartz, Luminescence), Reactor materials, Steel, Zirconium alloys, Niobium alloys, Boron alloys, Stainless steel, Crystals, Ultraviolet radiation, X rays, USSR.

Rept. for 1 Mar-30 Nov 63,
by H. G. Buschfort and A. Hundere. 23 Jun 64, 47p
Contract AF33 657 10037, Proj. 3044, Task 304401
APL TDR64 49

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gas turbines, Lubricants), (*Lubricants, Tests), Test equipment, Design, High-temperature research, Polymers, Ethers, Oils, Oil filters, Degradation, PH, Viscosity, Test methods.

The objective was to develop a test rig and a procedure to evaluate experimental gas turbine lubricants at surface temperatures up to 1000F and to yield results that are indicative of lubricant performance in advanced high mach gas turbine engines with respect to sludge, coke, acidity, and viscosity change. The program covered by this report was directed to studying the effect of variables on a polyphenyl ether, 0-61-20, utilizing a 48-hour test. Major emphasis was placed on the formation of deposits. Tests were also conducted on engine-tested MIL-L-7808 oils to further check the correlation previously established. (Author)

AD-606 406 Div. 14, 25, 26, 31
OTS Prices: HC $4.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
STUDY OF RESIDUAL STRESSES IN THICK GLASS FILAMENT REINFORCED LAMINATES.
Quarterly progress rept. no. 1, 30 Jun-Sep 64,
by F. E. Stone and L. B. Greszczuk. 30 Sep 64, 104p
SM-47728
Contract NObs90301, Proj. R007 03 04, Task 1008

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Laminated plastics, Filament wound construction), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), Pressure vessels, Plastics, Reinforcing materials, Mathematical analysis, Manufacturing methods, Winding, Tensile properties, Cylindrical bodies, Mandrels, Stresses.

The purpose of this program is to determine the presence and magnitude of residual stresses in thick wall fiberglas structures, and their effect on material properties; such that, the information will be applicable to full size deep submergence structures, and detrimental effects may be minimized or eliminated. Theoretical investigations, analysis methods, fabrication, and test results to date, are presented and related to each other in this report. Test results thus far have been restricted to hoop wound rings, from which residual circumferential stresses have been recorded as high as 19,000 psi. (Author)

AD-606 422 Div. 14, 30
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES, APPLIED CERAMIC RESEARCH PROGRAM.
Semiannual technical rept. for 1 Jan-30 Jun 62,
by E. G. Kendall. 12 Oct 62, 31p TDR-69(2240-63)TR-2
Contract AF04 695 69
DCAS TDR62 192

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ceramic materials, High-temperature research), Borides, Carbides, Boron compounds, Chromium compounds, Tantalum compounds, Titanium compounds, Tungsten compounds, Zirconium compounds, Molybdenum, Hafnium, Graphite, Niobium, Refractory materials, Laboratory equipment, Laboratory furnaces, Vacuum apparatus, Presses (Machinery), Casting, Electric arcs, Abrasive blasting, Powder metals, Purification, Refining (Metallurgy).

The major construction phase for establishing a suitable laboratory for ceramic research has been completed and the procurement of many key equipment items for this research has been concluded. Descriptions of key pieces of equipment that give the Aerospace Ceramic Laboratory a unique capability are presented. Although construction of the laboratory has seriously hampered significant research progress, work of a qualitative exploratory nature has been performed and is reviewed. (Author)

AD-606 456 Div. 14, 6, 12, 13
OTS Prices: HC $2.00/MF $0.50

Materials Research Corp., Orangeburg, N. Y.
CRYOGENIC LIQUID TRANSFER TECHNIQUES.
Rept. for 1 Apr 63-1 Apr 64,
by D. Ben-Israel and L. Skala. 1 Apr 64, 47p
Contract AF33 657 10920, Proj. 4056, Task 405601
AL TDR64 126

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cryogenics, Infrared detectors), (*Infrared detectors, Cryogenics), (*Liquified gases, Handling), (*Thermal insulation, Liquified gases), Pipes, Vacuum, Quartz, Fibers (Synthetic), Spacecraft, Vacuum apparatus, Glass textiles, Isocyanate plastics, Powders, Silicon compounds, Oxides, Calcium compounds, Silicates, Aluminum, Silver, Copper, Gold, Cadmium, Composite materials, Refrigeration systems, Neon, Hydrogen, Helium, Liquid cooled.

Applied research was carried out on the cooling of infrared radiation detector cells. In particular, problems associated with the insulation and transfer of cryogenic liquids were studied. A vapor-shielded vacuum-insulated closed loop transfer line was suggested as an optimum system for increased transfer efficiency. A new superinsulation material based on silverized quartz fibers was developed and incorporated in transfer lines. Various aspects of the technical applications of these developments are described and critically discussed. (Author)

AD-606 561 Div. 14, 32
OTS Prices: HC $4.00/MF $0.75

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
SUBJECT INDEX, BIBLIOGRAPHY, AND CODE DESCRIPTION OF TECHNICAL CONFERENCE PAPERS ON PLASTICS: 28 FEB 63-1 MAR 64.
Annual rept. no. 4,
by Arnold E. Molzon. Jul 64, 124p
PLASTEC 17

Unclassified report

Descriptors: (*Plastics, Reports), (*Subject indexing, Plastics), (*Bibliographies, Plastics), Indexes, Symposia, Physical properties, Materials.

The papers presented at technical conferences on plastic

15. Mathematics

AD-606 162 Div. 15, 28
OTS Prices: HC $3.00/MF $0.75

System Development Corp., Santa Monica, Calif.
BAYES DECISION PROCEDURES FOR STIMULUS SAMPLING MODELS: I. NONSEQUENTIAL EXPERIMENTATION.
Scientific rept.,
by Robert E. Dear. 28 Jul 64, 64p TM-1734/000/01
Unclassified report

Descriptors: (*Decision theory, Sampling), (*Sampling, Decision theory), (*Distribution theory, Sampling), Learning, Stimulation, Mathematical models, Statistical analysis.

In stimulus sampling models of learning, the probability distribution defined on the sequence of conditioning functions which are used in these models may be regarded as a distribution over parameters. Consequently, this probability distribution is interpreted as an a priori distribution and the appropriateness of Bayes decision procedures for solving statistical decision problems involving these models is shown. Using beta distributions as a tractable family of prior distributions over the parameters of the single element model, Bayes solutions are illustrated to: (1) the learning criterion problem, (2) parameter estimation problems, and (3) the optimal design of a learning experiment. (Author)

AD-606 172 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
ON THE CONCEPT OF FIFOV IN QUEUES.
Scientific rept.,
by B. Krishnamoorthi. 5 Aug 64, 24p
SP-1729/000/00
Unclassified report

Descriptors: (*Queueing theory, Statistical distributions), (*Statistical distributions, Queueing theory), Operations research.

In several queuing situations, the order in which the units depart is not the same as the order in which they arrived at the system. This phenomenon is called the 'Violation of the 'First In, First Out' principle' (FIFOV). A quantitative study of FIFOV is of operational importance in tandem queuing and many other situations. In this paper is given a general discussion of the concept and study of a special aspect of FIFOV in a Poisson Queue (Poisson input and exponential service times) with two heterogeneous servers working in parallel. In this connection the time-dependent distribution of the output in a M/M/1 queue has been explicitly obtained. Defining X as the number of customers superseding a customer taking service from the slower channel, one obtains the distribution and the first two moments of X under a queue discipline which is a modification of the usual one. An optimality criterion has also been suggested.

AD-606 176 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
ON AN UNSOLVED PROBLEM IN OPTIMAL SEQUENCING.
Scientific rept.,
by William Karush. 27 Aug 64, 8p SDC-SP-1750
Unclassified report

Descriptors: (*Scheduling, Sequential analysis), (*Sequential analysis, Scheduling), Numerical methods and procedures, Operations research, Optimization.

The sequencing problem considered is that of determining the arrangement of n jobs through M machines, or processing centers, so as to minimize the total processing time; it is assumed that the processing time of each job on each machine is given, that all jobs processed through the M machines in the same prescribed order, and that no passing between machines is allowed. A recently published algorithm for determining an optimal sequence is examined. A counter-example is constructed for which the proposed method fails, showing that the 'general' algorithm does not solve the sequencing problem; the example involves three jobs and three machines. (Author)

AD-606 182 Div. 15
OTS Prices: HC $1.00/MF $0.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
MULTI-STAGE SAMPLING FOR ESTIMATION OF THE NUMBER OF ITEMS COMMON TO TWO OF MORE LISTS OF ITEMS,
by C. T. Abraham. Aug 62, 23p
Contract AF19 626 10
Unclassified report

Descriptors: (*Sampling, Statistical analysis), Correlation techniques, Probability, Functional analysis.

AD-606 184 Div. 15
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison.
ANALYTIC THEORY OF ENTIRE FUNCTIONS
by Walter Schneider. 1 Sep 64, 10p
Grant Nonr G000 19 64
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Functions, Theory), Algebraic topology, Algebras, Complex variables, Difference equations, Taylor's series.

AD-606 187 Div. 15, 2
OTS Prices: HC $1.00/MF $0.50

Brown Univ., Providence, R. I.
EXTENSIONS TO THEORY OF TIME-SERIES ANALYSIS.
Quarterly rept. no. 8, 1 May-31 Jul 64,
by Walter Freiberger. 31 Jul 64, 8p
Contract DA36 039sc87222, Proj. 3A99 25 002
Unclassified report

Descriptors: (*Statistical analysis, Theory), (*Series, Time), (*Statistical processes, Meteorology), (*Probability, Weather forecasting), Stochastic processes, Mathematical prediction, Correlation techniques.

During the quarter, some minor questions in statistical meteorology were explored. One of these concerns the geometry of the iso-correlation curves of a meteorological field. Rather little is known about this, since, on the one hand, the non-isotropy of the random process involved makes a theoretical discussion difficult and, on the other hand, paucity of empirical data limit qualitative insight into the properties of the correlation field. Stimulated by some Russian work (Yudin and Vulis, Izv. Geophys. Ser., No. 1, 1964, pp. 124-135), renewal attention is being given to the

AD-606 793 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Philco Research Labs., Newport Beach, Calif.
OPTICAL AND INFRARED PROPERTIES OF Al2O3 AT ELEVATED TEMPERATURES.

Final technical rept., vol. 2, 1 Aug 63-31 May 64, by D. A. Gryvnak and D. E. Burch. 31 May 64, 39p U-2623
Contract Nonr3606 00, ARPA Order237
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aluminum compounds, Oxides), (*Sapphires, Optical properties), Infrared phenomena, Absorption, Emissivity, Refractive index, Flames, Crystals, Ceramic materials, High-temperature research, Single crystals.

An investigation was made of the absorption coefficient and the index refraction as a function of both wavelength and temperature. Samples of single crystals of Al2O3 (sapphire) were heated to various temperatures up to 2020C. The absorption coefficient and index of refraction were measured as a function of wavelength from 0.546 microns to approximately 6 microns. Measurements of the emission of polycrystalline Al2O3, which is a ceramic material made for use in high temperature furnaces, indicates that the general behavior of the emissivity is similar to what one would expect on the basis of the measurements of the absorption coefficient of the single crystal sapphire. (Author)

AD-606 836 Div. 14, 25, 27
OTS Prices: HC $5.00/MF $1.00

General Electric Co., Cincinnati, Ohio.

REFRACTORY MATERIALS RESEARCH.
Final annual rept. for 1 Jul 62-30 Oct 63, by G. M. Kibler, T. F. Lyon, M. J. Linevsky, and V. J. DeSantis. Aug 64, 154p
Contract AF33 616 6841, Proj. 4776, ARPA Order 24 62, Task 6
WADD TR60 646 P4
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Refractory materials, Rocket motor nozzles), (*Ceramic materials, Rocket motor nozzles), (*Emissivity, Ceramic materials), (*Vapor pressure, Ceramic materials), Vaporization, Hafnium compounds, Tantalum compounds, Nitrides, Zirconium compounds, Borides, Oxides, Thororium compounds, Resonance absorption, Graphite, Tungsten, Single crystals, Heat of formation, Infrared spectroscopy, Test methods, High-temperature research, Thermodynamics.

In continuation of work begun earlier, vapor pressure studies of hafnium and tantalum nitride were completed using Knudsen effusion method combined with a gas collection and measuring system. The vaporization of ZrB2 has been studied, also by a Knudsen effusion method, modified in this application to obtain the effusion rate by continuous weighing of condensed effusate. Matrix isolation studies of the vapor from ZrO2 and HfO2 have been made as have additional measurements with ThO2 which was a subject of an earlier investigation. Resonance line absorption photometry has been applied to ZrB2. The results obtained are presented and discussed. Normal spectral emissivity data on single crystal tungsten, pyrolytic graphite and tantalum nitride have been obtained and are reported herein. (Author)

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Calculus of variations, Differential equations), (*Differential equations, Calculus of variations), Functions, Complex variables, Inequalities, Dynamic programming.

AD-606 266 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON MATRIX THEORY; XIV: ON THE JACOBI RELATION FOR THE BRACKET SYMBOL,
by Richard Bellman. 12 Feb 57, 5p P-1018
Unclassified report

Descriptors: (*Matrix algebra, Theory), Polynomials, Equations, Algebra, Permutations.

This paper contains a derivation of the Jacobi relation for the bracket symbol using the associative property of exponential matrices. (Author)

AD-606 272 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SEQUENTIAL DECISION PROBLEMS WITH A LIMITED MEMORY,
by M. B. Marcus. 17 Oct 57, 16p P-1201
Unclassified report

Descriptors: (*Mathematical prediction, Optimization), (*Decision theory, Mathematical prediction), Probability, Sequences.

AD-606 274 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SIMPLEX METHOD FOR QUADRATIC PROGRAMMING,
by Philip Wolfe. 25 Oct 57, rev. 1 Apr 59, 36p
P-1205
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Quadratic programming, Numerical methods and procedures), (*Linear programming, Numerical methods and procedures), (*Numerical methods and procedures, Quadratic programming), Operations research.

A computational procedure is given for finding the minimum of a quadratic function of variables subject to linear inequality constraints. The procedure is analogous to the Simplex Method for linear programming, being based on the Barankin-Dorfman procedure for this problem. (Author)

AD-606 275 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
OPTIMUM LINEAR ESTIMATION FOR RANDOM PROCESSES AS THE LIMIT OF ESTIMATES BASED ON SAMPLED DATA,
by Peter Swerling. 24 Oct 57, 24p P-1206
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Mathematical prediction, Probability), (*Optimization, Mathematical prediction), Statistical analysis, Integral equations, Stochastic processes, Sampling, Errors, Theorems, Signals.

A generalized form of the problem of optimum linear filtering and prediction for random processes is considered. It is shown that, under very general conditions, the optimum linear estimation based on the received signal, observed continuously for a finite interval is the limit of optimum linear estimation based on sampled data. This yields a method for obtaining the optimum linear estimation in cases where the conventional generalized Wiener-Hopf integral equation technique has not been shown to yield a solution. The relationship between the sampled-data solution and the Wiener-Hopf integral equation solution is discussed. A problem is posed concerning the rate at which the error variance of optimum sampled-data estimates approaches the error variance of the optimum estimate based on continuous observation, as the sampled points become denser in the observation interval. This problem is solved in one case.

AD-606 277 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON INEQUALITIES FOR DIFFERENTIAL OPERATORS,
by Richard Bellman. 28 Oct 57, 15p P-1207
Unclassified report

Descriptors: (*Inequalities, Operators, (Mathematics)), (*Operators (Mathematics), Inequalities), Differential equations, Functional analysis, Functions.

In this paper the following problem was studied: Given that certain functionals of u and its derivatives belong to given L-classes over the infinite interval, what can be said about the L-classes of other functionals. Utilizing a simple device from the theory of linear differential equations, results were obtained due to Landau, Kolmogoroff, Halperin-von Neumann, and Nagy, together with some extensions. (Author)

AD-606 292 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 21,
by Cecil Hastings, Jr. and Elaine Hastings.
4 Mar 57, 11p P-1033
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Numerical methods and procedures.

Analytical approximations of chi-square integrals are presented.

AD-606 300 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND THE VARIATIONAL SOLUTION OF THE THOMAS-FERMI EQUATION,
by Richard Bellman. 14 Mar 57, 9p P-1038
Unclassified report

statistical properties of the random errors occuring in finite-difference approximations of partial differential equations. In particular, the mean values and spectral densities of various such approximations are being studied. (Author)

AD-606 196 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TESTS OF HOMOGENEITY FOR CORRELATED SAMPLES,
by Albert Madansky. Mar 62, 22p P-2325
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Sampling, Statistical tests), (*Statistical tests, Sampling), (*Statistical processes, Statistical tests), Probability, Stochastic processes, Permutations, Statistical distributions, Population (Mathematics), S-matrix.

This paper presents techniques for testing various hypotheses related to the notion of temporal homogeneity of a population each of whose members can belong to any one of S states at any time. These hypotheses include Cochran's permutability hypothesis, the hypothesis of strict exchange, the usual homogeneity hypothesis for multinominal distributions in the presence of correlated samples, and the hypothesis that a first order Markov chain is in a steady state. (Author)

AD-606 207 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPROXIMATION OF EMPIRICAL FUNCTIONS OF DISCRETE DISTRIBUTION BY DISCONTINUOUS ORTHOGONAL POLYNOMIALS,
by Vettin. 26 Nov 47, 22p T-7
TT 64 71446
Unclassified report

Trans. of an unidentified mono., n.p., n.d.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Least squares method, Polynomials, Special functions (Mathematical), Differential equations.

Compensation of empirical functions by whole rational functions according to the Gaussian method of least squares leads to systems of linear equations the solution of which, at large numbers of given functional values, becomes very difficult, and becomes numerically impossible with increasing number of values. Application of orthogonal polynomials developed in this paper eliminates the solution of these systems of equation, and by means of these orthogonal polynomials whole rational functions can be given rapidly which approximate with any desired degree of accuracy the given functional values, and which in the limiting case, yield the exact interpolation. By means of an example (N = 75) application of this method is demonstrated. (Author)

AD-606 254 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE IDENTIFICATION OF SYSTEMS AND THE UNSCRAMBLING OF DATA-I: HIDDEN PERIODICITIES,
by R. E. Bellman, H. H. Kagiwada, and R. E. Kalaba.
Sep 64, 9p RM-4285-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Boundary value problems, Numerical analysis), Nonlinear systems, Systems engineering, Control, Mathematical prediction, Equations, Identification, Data, Sources.

A general problem of great interest in science and control engineering is that of identifying a system on the basis of observations. This is viewed as a nonlinear multi-point boundary-value problem which can be resolved numerically using the method of quasilinearization. The first paper in the series is devoted to the hunt for hidden periodicities in data and provides an attractive alternative to the classical periodogram analysis. (Author)

AD-606 259 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND STOCHASTIC CONTROL PROCESSES,
by Richard Bellman. Rev. 27 Jan 58, 21p P-1003
Unclassified report

Descriptors: (*Dynamic programming, Stochastic processes), (*Stochastic process, Dynamic programming), Feedback, Control systems, Dynamics, Calculus of variations, Differential equations.

It is shown how the functional equation technique of dynamic programming may be used to obtain a new computational and analytic approach to variational problems. The limited memory capacity of present-day digital computers limits the successful application of these techniques to first and second order systems at the moment, with limited application to higher order systems.

AD-606 263 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON MONOTONE CONVERGENCE TO SOLUTIONS OF FIRST ORDER DIFFERENTIAL EQUATIONS,
by Richard Bellman. 16 Jan 57, 8p P-1012
Unclassified report

Descriptors: (*Differential equations, Numerical analysis), (*Numerical analysis, Differential equations), (*Sequences, Numerical analysis), Functions, Equations, Dynamic programming.

The purpose of this brief note was to show that one can obtain a monotone increasing sequence of approximations to the solution of the differential equation du/dt = phi(u,t), u(o) = c, provided that one assume that phi(u,t) is a twice differentiable convex function of u in some t-interval (o,t sub 0). Similarly, monotone decreasing sequences can be obtained if phi is concave. (Author)

AD-606 264 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON GRADIENT METHODS FOR APPROACHING CONSTRAINED MAXIMA,
by Kenneth J. Arrow, Leonid Hurwicz, and Thomas Marschak. 1 Feb 57, 25p P-1015 Unclassified report

account of the fundamental ideas of the theory of games, together with a discussion of some of the unresolved aspects of the theory. (Author)

AD-606 366 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE NON-NEGATIVITY OF GREEN'S FUNCTIONS,
by Richard Bellman. 18 Apr 57, 7p P-1065
Unclassified report

Descriptors: (*Green's function, Theorems), Partial differential equations.

The purpose of the paper is to give a short proof of the non-negativity of Green's functions associated with certain classes of differential equations. (Author)

AD-606 367 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A MARKOVIAN DECISION PROCESS,
by Richard Bellman. 18 Apr 57, 14p P-1066
Unclassified report

Descriptors: (*Obsolescence theory, Dynamic programming), (*Statistical processes, Dynamic programming), (*Dynamic programming, Statistical processes), Matrix algebra, Probability, Decision theory.

The purpose of this paper is to discuss the asymptotic behavior of the sequence (f sub n(i)) generated by a nonlinear recurrence relation. This problem arises in connection with an equipment replacement problem, cf. S. Dreyfus, A Note on an Industrial Replacement Process.

AD-606 368 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON THE NUMERICAL INTEGRATION OF A CLASS OF NON-LINEAR HYPERBOLIC DIFFERENTIAL EQUATIONS,
by Richard Bellman, I. Cherry, and G. M. Wing.
22 Apr 57, 6p P-1067
Unclassified report

Work done under the auspices of the U. S. Atomic Energy Commission.

Descriptors: (*Nonlinear differential equations, Integration), (*Integration, Nonlinear differential equations), Numerical analysis, Partial differential equations.

The purpose of this paper was to introduce a new method for the numerical integration of a class of non-linear hyperbolic partial differential equations which admit shocks. The equation u sub t = -uu sub x is discussed, and numerical results are given. (Author)

AD-606 375 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SMALL SAMPLE DISTRIBUTION OF n omega sub n(2),
by A. W. Marshall. 2 May 57, 7p P-1077
Unclassified report

Legibility of the document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical functions, Functional analysis), Statistical analysis, Geometric forms, Spheres.

AD-606 378 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUNCTIONAL EQUATIONS IN THE THEORY OF DYNAMIC PROGRAMMING--VIII: THE VARIATION OF GREEN'S FUNCTIONS, ONE DIMENSIONAL CASE,
by Richard Bellman. 8 May 57, 8p P-1081
Unclassified report

Descriptors: (*Dynamic programming, Equations), (*Green's function, Dynamic programming), Differential equations, Theory.

The functional equation technique of dynamic programming is used to study the dependence of the Green's function of the equation u' + q(x)u = f(x), u(a) = u(1) = 0, upon the parameter a. (Author)

AD-606 379 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE DETERMINATION OF CHARACTERISTIC VALUES FOR A CLASS OF STURM-LIOUVILLE PROBLEMS,
by Richard Bellman. Revised 19 Sep 57, 20p P-1082
Unclassified report

Descriptors: (*Differential equations, Complex numbers), Matrix algebra, Transformations, (Mathematics), Boundary value problems, Functions, Partial differential equations.

In this paper is presented a new method for obtaining the characteristic values of the Sturm-Liouville problem u' + lambda a(t)u = o, u(o) = u(1) = o. The method yields upper and lower bounds and is particularly suitable for problems in which the first and second characteristic values are desired to a high degree of accuracy. (Author)

AD-606 380 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE VARIATION OF THE FREDHOLM RESOLVENT,
by Richard Bellman. 13 May 57, 7p P-1084
Unclassified report

Descriptors: (*Integral equations, Green's functions), (*Green's functions, Integral equations), Functions, Equations, Dynamic programming, Boundary value problems, Calculus of variations.

In this paper is studied the dependence of the Fredholm resolvent upon the end-points of the interval, and, using the same technique, a formula is derived due to Schiffer concerning the variation of a Green's function upon a parameter. (Author)

AD-606 381 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

Descriptors: (Dynamic programming, Equations), Partial differential equations, Boundary value problems.

AD-606 304 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON MATRIX THEORY; XV: MULTIPLICATIVE INEQUALITIES OBTAINED FROM ADDITIVE INEQUALITIES,
by Richard Bellman. 27 May 57, 6p P-1095
Unclassified report

Descriptors: (*Matrix algebra, Theory), (*Inequalities, Matrix algebra), Set theory, Algebra.

In this paper, it is shown how multiplicative inequalities for the characteristic values of positive definite matrices can be obtained from additive inequalities. (Author)

AD-606 306 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
KRONECKER PRODUCTS AND THE SECOND METHOD OF LYAPUNOV,
by Richard Bellman. 29 May 57, 9p P-1097
Unclassified report

Descriptors: (*Matrix algebra, Differential equations), (*Differential equations, Matrix algebra), Invariance, Stability, Numerical analysis, Numbers.

The second method used by Lyapunov to study the stability of the trivial solution of $dx/dt = Ax + f(x)$ leads to the problem of solving the matrix equation $AX + XA' = C$. It is shown that this question is related to Kronecker products and Kronecker sums, and the general problem of solving $AX + XB = C$ is resolved in this fashion. (Author)

AD-606 308 Div. 15, 30
OTS Prices: HC $3.00/MF $0.75

Applied Logic Corp., Princeton, N. J.
TOWARD SEMI-AUTOMATED MATHEMATICS: THE LANGUAGE AND LOGIC OF SAM III.
Scientific rept. no. 2,
by James H. Bennett, William B. Easton, James R. Guard, and Thomas H. Mott, Jr. 1 May 64, 90p
Contract AF19 628 3250, Proj. 5632, Task 563205
AFCRL 64 563
Unclassified report

Descriptors: (*Mathematical logic, Theorems), (*Programming (Computers), Mathematical logic), Mathematics, Metamathematics, Simulation, Automatic, Programming languages, Computers

This report describes the third in a series of computer experiments designed to explore the extent to which computers may feasibly be used in doing formal mathematics. All the experiments are based on and employ principles of man-machine interaction. The first two, dubbed SAM I and SAM II, are described in an earlier report (AD-413 929). They consist of a source language, closely resembling the language of mathematical logic, and an associated machine language processor for specifying exact procedures for building proofs in elementary natural deductive and first-order axiom systems of mathematics such as the propositional calculus, elementary group theory and set theory. The third program, described in this report, represents an attempt to extend the capabilities of these programs to handle more advanced systems of mathematics. Dubbed SAM III, the program includes the salient features of SAM I and SAM II but, in addition, contains provisions for the introduction of quantification theory, inference by substitution for variables of finite, mixed types, automatic application of rules of propositional and equality inference, and other important features. Natural deduction is retained as the basic method for carrying out proofs in the system. (Author)

AD-606 322 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Innsbruck Univ. (Austria).
APPLICATION OF SPINOR METHODS TO RIEMANNIAN MANIFOLDS.
Quarterly technical status rept. no. 3, 1 Mar-31 May 64,
by F. Cap. 31 May 64, 10p
Contract DA91 591EUC2947
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Algebraic topology, Relativity theory), (*Relativity theory, Algebraic topology), Transformations (Mathematics), Differential geometry, Invariance, Groups (Mathematics), Momentum.

Spinors are defined by their special transformation behavior in the special theory of relativity. The most fundamental problem in a spinor theory in the general theory of relativity is therefore the way in which spinors in Riemannian space undergo transformations. The purpose of this report was to summarize subsequent investigations and their results. A detailed account is to be given in Special Report no. 8. The topics covered in this report include 1) Fundamentals of spinor transformations in Riemannian space; 2) Spin and angular momentum in the general theory of relativity; and 3) Appraisal of the literature.

AD-606 325 Div. 15
OTS Prices: HC $1.00/MF $0.50

Innsbruck Univ. (Austria).
REPORT ON A VISIT OF PROF. E. SCHMUTZER.
Special scientific rept. no. 6,
by W. Majerotto and F. Cap. 3 Jan 64, 10p
Contract DA91 591EUC2947
Unclassified report

Legibility of this document is in part unsatisfactory.

Descriptors: (*Mathematics, Theory), (*Reviews, Mathematics), Tensor analysis, Differential geometry, Special functions (Mathematical), Partial differential equations, Relativity theory, Algebraic topology, Matrix algebra, Groups (Mathematics).

AD-606 365 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE THEORY OF GAMES,
by Richard Bellman. 15 Apr 57, 22p P-1062
Unclassified report

Descriptors: (*Game theory, Reviews), Theorems, Mathematical logic, Operations research.

The purpose of this paper is to present an expository

AD-606 442 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 23,
by Cecil Hastings, Jr. and Elaine Hastings.
28 Jun 57, 3p P-1117
Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Tables, Numerical methods and procedures.

Analytical approximations of chi-square integrals are presented in tabular form.

AD-606 448 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE REPRESENTATION OF THE SOLUTION OF A CLASS OF STOCHASTIC DIFFERENTIAL EQUATIONS,
by Richard Bellman. 9 Jul 57, 6p P-1125
Unclassified report

Descriptors: (*Dynamic programming, Differential equations), (*Differential equations, Dynamic programming), Stochastic processes, Statistical functions.

A discussion is given of a representation of the distribution function of the solution of the stochastic differential equation $u' = g(u) + r(t)$, where $r(t)$ is a given stochastic function, and $g(u)$ is assumed to be either strictly convex or strictly concave for all u. Extensions of this result to more general types of nonlinear functional equations may be readily obtained. (Author)

AD-606 451 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CASINO THAT TAKES A PERCENTAGE AND WHAT YOU CAN DO ABOUT IT,
by Leonard J. Savage. Revised 17 Oct 57, 17p
P-1132
Unclassified report

Descriptors: (*Dynamic programming, Probability), (*Probability, Dynamic programming), Inequalities, Functions, Stochastic processes.

If the casino's cut is at least 100 gamma %, then the probability of running a fortune up to t times its original value is less than $1 - ((t - 1)/t)$ to the 1-gamma power, but it can sometimes be nearly that much. (Author)

AD-606 452 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, NONLINEAR VARIATIONAL PROCESSES, AND SUCCESSIVE APPROXIMATIONS,
by Richard Bellman. Revised 6 Sep 57, 8p P-1133
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dynamic programming, Nonlinear systems), (*Numerical analysis, Dynamic programming), Linear systems, Functions, Equations.

The object of the paper is to show that a blend of dynamic programming, successive approximations and digital computers enables one to approach various classes of nonlinear variational problems formerly far beyond reach.

AD-606 462 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND MEAN SQUARE DEVIATION,
by Richard Bellman. Rev. 13 Sep 57, 13p P-1147
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Dynamic programming, Equations), (*Statistical analysis, Dynamic programming), Functions, Quadratic programming, Theory, Sequences.

Some applications are given of the functional equation technique of dynamic programming to the treatment of some quadratic variational problems and the linear equations arising therefrom.

AD-606 463 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME NEW TECHNIQUES IN THE DYNAMIC PROGRAMMING SOLUTION OF VARIATIONAL PROBLEMS,
by Richard Bellman. 6 Aug 57, 22p P-1148
Unclassified report

Descriptors: (*Dynamic programming, Numerical analysis), Equations, Functions, Linear systems.

It was seen that the numerical solution of a problem involving N state variables depended upon the computation of sequences of functions of N variables. This fact made the method routine only for the case where N = 1 or 2, with grave difficulties arising in the general case. In the paper, it is indicated how to overcome this difficulty for a large class of problems in which the underlying equations and the criterion function are linear, although the restraints on the forcing functions may be nonlinear, corresponding say to energy considerations. Finally, it is briefly indicated how the method of successive approximations may be combined with the foregoing techniques to reduce general variational problems, in which the equations and criterion function are nonlinear, to sequences of problems which can be solved numerically by means of sequences of functions of one variable. (Author)

AD-606 464 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND THE VARIATION OF GREEN'S FUNCTIONS,
by Richard Bellman and Howard Osborn.
6 Aug 57, 10p P-1150
Unclassified report

Descriptors: (*Dynamic programming, Equations), (*Green's function, Dynamic programming), Analysis of variance, Partial differential equations, Quadratic programming.

The functional equation technique of dynamic programming is applied to the study of quadratic functionals whose Euler variational equations are linear self-adjoint partial

MULTI-DIMENSIONAL MAXIMIZATION AND DYNAMIC PROGRAMMING,
by Richard Bellman. 14 May 57, 18p P-1086
Unclassified report

Descriptors: (*Dynamic programming, Optimization), Linear programming, Search theory, Calculus of variations, Equations, Distribution (Economics).

A discussion is given of some of the difficulties arising in multi-dimensional maximization problems and some of the special types of problems which can be treated by dynamic programming techniques. The topic of linear programming is included. (Author)

AD-606 385 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TOPOLOGICAL DYNAMICS; A BOOK REVIEW,
by Walter Helbig Gottschalk, Gustav Arnold Hedlund, and Richard Bellman. 20 May 57, 3p P-1090
Unclassified report

American Mathematical Society Colloquium Publications, vol. 36, Providence, R. I., 1955.

Descriptors: (*Topology, Reviews), Differential equations, Dynamics, Theorems.

AD-606 387 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS VOLUME 22,
by Cecil Hastings, Jr. and Elaine Hastings.
29 May 57, 3p P-1098
Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Integral equations, Numerical methods and procedures.

A numerical approximation.

AD-606 415 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE OPTIMALITY OF SEQUENTIAL PROBABILITY RATIO TESTS,
by Theodore K. Matthes. Feb 62, 7p P-2541
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Statistical tests, Optimization), (*Sequential analysis, Statistical tests), Probability, Sequences, Mapping (Transformations), Theorems.

The sequential probability ratio test for testing a simple hypothesis Hsub0 against a single alternative Hsub1 was first proved to be optimal by Wald and Wolfowitz in a sense there defined. A much simpler proof has been given by L. LeCam and appears in Lehmann's book. In the present note a proof of this optimality is given which relies primarily on a simple mapping theorem. (Author)

AD-606 430 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TERMINAL CONTROL, TIME-LAGS AND DYNAMIC PROGRAMMING,
by Richard Bellman. 10 Jun 57, 7p P-1101
Unclassified report

Descriptors: (*Dynamic programming, Equations), Time-lag theory, Control systems, Linear systems, Functions.

AD-606 439 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RANDOM WALK, SCATTERING AND INVARIANT IMBEDDING. I: ONE-DIMENSIONAL DISCRETE CASE,
by Richard Bellman and Robert Kalaba. 27 Jun 57, 9p P-1113
Unclassified report

Descriptors: (*Numerical methods and procedures, Invariance), (*Stochastic processes, Scattering), Probability, Numerical analysis, Elementary particles, Equations, Functions.

In this paper, a new method was introduced of treating problems involving random walk processes, based upon the principle of invariant imbedding which were introduced and applied in previous papers. Since scattering processes can often be formulated in terms of random walk, a new method of treating scattering processes was found.

AD-606 440 Div. 15, 5
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SUGGESTED COMPUTATION FOR MAXIMAL MULTI-COMMODITY NETWORK FLOWS,
by L. R. Ford, Jr. and D. R. Fulkerson. Revised 27 Mar 58, 12p P-1114
Unclassified report

Descriptors: (*Networks, Mathematical analysis), (*Linear programming, Combinatorial analysis), Iterative methods, Operations research.

A simplex computation for an arc-chain formulation of the maximal multi-commodity network flow problem is proposed. Since the number of variables in this formulation is too large to be dealt with explicitly, the computation treats non-basic variables implicitly by replacing the usual method of determining a vector to enter the basis with several applications of a combinatorial algorithm for finding a shortest chain joining a pair of points in a network. (Author)

AD-606 441 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A LINEAR DIOPHANTINE PROBLEM,
by S. M. Johnson. 28 Jun 57, rev. 16 Jul 59, 19p P-1115
Unclassified report

Descriptors: (*Equations, Prime numbers), (*Prime numbers, Metamathematics), Permutations, Algebra, Numerical analysis, Number theory, Combinatorial analysis, Set theory.

Given a relatively prime set of integers a sub 1, a sub 2, a sub 3, the author finds the largest integer B not represented in the form xa sub 1 + ya sub 2 + za sub 3, for positive integers x, y, z. In doing so, several relations are developed which may be of interest in themselves. (Author)

requiring multi-dimensional sequences of functions when treated by the direct methods of dynamic programming can, by means of a transformation familiar to the theory of linear functional equations of differential, difference, or differential-difference type, be reduced to problems involving sequences of functions of one variable in a number of cases, and sequences of functions of two variables in others. These results open the door to a systematic study of nonlinear control processes, with or without time-lags and other types of hereditary behavior, by way of the method of successive approximations.

AD-606 528 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EXISTENCE OF CONSERVATION LAWS, I.
by Howard Osborn. 3 Sep 57, 30p P-1164
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Differential geometry, Theorems), (*Transformations (Mathematics), Functions), Mapping (Transformations), Matrix algebra, Algebraic topology, Partial differential equations.

For certain linear transformations of the Pfaffian forms at each point of a neighborhood of an analytic manifold, a construction is given of all the locally exact forms whose image is also locally exact. (Author)

AD-606 529 Div. 15, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MONTE CARLO,
by Herman Kahn and Irwin Mann. 30 Jul 57, 30p
P-1165
Unclassified report

Prepared for inclusion as a chapter in a book intended for publication entitled 'Military Planning In An Uncertain World.'
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Monte Carlo methods, Military strategy), Game theory, Sampling, Statistical analysis, Probability, Operations research.

AD-606 530 Div. 15, 18, 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
GAME THEORY,
by Herman Kahn and Irwin Mann. 30 Jul 57, 68p
P-1166
Unclassified report

Prepared for inclusion as a chapter of a book intended for publication, entitled 'Military Planning In An Uncertain World.'
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Reviews), (*Operations research, Game theory), Military strategy, Economics, Political science, Social sciences, Probability.

An introduction to the principles of game theory is presented through the following examples and discussions: matching pennies, modified matching game, a game of ruin, noisy duel, silent duel, some definitions and formal results, attacking targets of unequal importance, the trader and the cannibal, two-person non-zero sum games, n-person games (the princess and her three suitors, the bankruptcy court, a pure coalition game, the community of Shangri-La, games of deterence).

AD-606 537 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, SUCCESSIVE APPROXIMATIONS AND VARIATIONAL PROBLEMS OF COMBINATORIAL NATURE,
by Richard Bellman. 13 Sep 57, 8p P-1175
Unclassified report

Descriptors: (*Control systems, Dynamic programming), (*Dynamic programming, Combinatorial analysis), (*Combinatorial analysis, Dynamic programming), (*Iterative methods, Dynamic programming), Nonlinear systems, Scheduling, Communication theory, Calculus of variations, Equations, Digital computers.

This paper shows that a combination of dynamic programming and the classical method of successive approximations permits a systematic study of various classes of combinatorial problems arising in scheduling theory, communication theory and network theory. Although the method cannot guarantee convergence to the actual solution, it furnishes a monotonic sequence of approximations by means of approximation in policy space. An important feature of the method is the use of the solution of sub-problems of considerable magnitude as steps in the approximation procedure. With the aid of digital computers and the techniques of dynamic programming, this is a feasible method. The Hitchcock-Koopmans transportation problem, an allocation problem, and the travelling salesman problem are discussed. (Author)

AD-606 538 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUNCTIONAL APPROXIMATIONS AND DYNAMIC PROGRAMMING,
by Richard Bellman and Stuart Dreyfus.
rev. 28 Apr 59, 12p P-1176
Unclassified report

Descriptors: (*Dynamic programming, Equations), (*Numerical analysis, Dynamic programming), Sequential analyses, Functional analysis, Partial differential equations, Nonlinear systems, Digital computers.

This paper indicates some ways in which the theory of approximation can be used to increase the range of present day computers. Although the primary interest is in applying these techniques to the functional equations occurring in the theory of dynamic programming. These same methods are applicable, and even more readily, to the classical functional equations of mathematical physics. The objective of the paper is to trade additional computing time, which is expensive, for additional memory capacity, which does not exist.

AD-606 541 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

differential equations of the second order. A first consequence is the classical Hadamard variational formula for the Green's function of a region. Some extensions are indicated. (Author)

AD-606 465 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A MULTIMOVE INFINITE GAME WITH LINEAR PAYOFF,
by Leonard D. Berkovitz and Melvin Dresher.
22 Sep 58, 53p P-1151
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Game theory, Mathematical logic), (*Mathematical logic, Game theory), Functions, Theorems, Operations research.

This paper analyzes a multimove infinite game with linear payoff function. The game had its origin in the consideration of a military problem, but is presented here solely for its mathematical interest. It is symmetric in every respect except that the initial conditions of the two players are different. On each move, each player allocates his resources to tasks that might be described roughly as attacking, defending, and scoring. His resources for the next move are diminished by the amount that his opponent's attack exceeds his own defense, while his score cumulates from move to move. The value of the game and the optimal strategies for the players are rigorously derived in the present paper. It is shown that one player has a pure optimal strategy and the other player must randomize. (Author)

AD-606 466 Div. 15
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
ON THE ESTIMATION OF THE KLOOSTERMAN SUM,
by D. R. Anderson. 7 Aug 57, 12p P-1152
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Integrals, Fourier analysis), (*Fourier analysis, Integrals), (*Integral transforms, Fourier analysis), Prime numbers, Numerical analysis, Complex numbers.

The Kloosterman sum K(m sub 1, m sub 2; n) is considered in the case where n is a prime. An estimate is obtained by using a method of Mordell to express the sum in terms of contour integrals which are in turn put into an accessible form by analytic continuation and use of the Mellin Transform. (Author)

AD-606 467 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE NON-NEGATIVITY OF SOLUTIONS OF THE HEAT EQUATION,
by Richard Bellman. 12 Aug 57, 7p P-1153
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Partial differential equations, Thermodynamics), (*Thermodynamics, Partial differential equations), Numerical analysis, Difference equations, Functions.

It is shown that non-negativity of the solution of the heat equation, given non-negative initial values, and suitable boundary conditions, can be established quite readily once the existence of a solution of the equation depending continuously upon the initial values was demonstrated. It is shown that this property is trivially true for the solution of the appropriate finite difference approximation to the partial differential equation, and that the convergence of the solution of the finite difference equation to the solution of the original equation is quite simple, under the above conditions. (Author)

AD-606 485 Div. 15, 23, 28
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
OPTIMAL SELECTION BASED ON RELATIVE RANK (THE 'SECRETARY PROBLEM'),
by Y. S. Chow, S. Moriguti, H. Robbins, and S. M. Samuels. 1 Sep 64, 18p CU-47-64-Nonr-266(59)MS
Contracts Nonr1100 26, Nonr266 59, Proj. 042 205
Unclassified report

Descriptors: (*Decision theory, Game theory), (*Game theory, Decision theory), (*Dynamic programming, Optimization), Probability, Decision making, Permutations, Inequalities, Stochastic processes, Selection, Personnel.

AD-606 518 Div. 15
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
ON THE ASYMPTOTIC THEORY OF FIXED-WIDTH SEQUENTIAL CONFIDENCE INTERVALS FOR THE MEAN,
by Y. S. Chow and Herbert Robbins. 9 Sep 64, 12p
CU-46Nonr-266(59)MS
Contracts Nonr1100 26, Nonr266 59,
Proj. 042 205
Unclassified report

Prepared in cooperation with Purdue Univ., Lafayette, Ind.

Descriptors: (*Statistical analysis, Theory), Measure theory, Population (Mathematics), Probability, Sequences, Theorems, Differential equations, Stochastic processes.

AD-606 525 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND THE COMPUTATIONAL SOLUTION OF FEEDBACK DESIGN CONTROL PROBLEMS,
by Richard Bellman. 15 Aug 57, 28p P-1155
Unclassified report

Descriptors: (*Dynamic programming, Control systems), (*Control systems, Dynamic programming), (*Calculus of variations, Dynamic programming), Mathematical models, Feedback, Equations, Differential equations, Numerical analysis, Partial differential equations, Optimization, Functions, Time-lag theory, Sequences, Nonlinear systems, Digital computers.

This paper indicates how a class of control processes

In order to evaluate a(1/p) for a in the interval (0,1) by Newton's method, the standard practice for digital computer programs is to use the uniform initial estimate of 1. By using a piecewise linear approximation the computational effort can in the general case be considerably reduced. The convergence of Newton's method to a(1/p) is analyzed when the 'firstguess' is determined by the above approximation.

AD-606 591 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A TOURNAMENT PROBLEM,
by Lester R. Ford, Jr. and Selmer M. Johnson.
Revised 9 May 58, 9p P-1215

Unclassified report

Descriptors: (*Game theory, Optimization), Iterative methods, Functions, Series, Numerical analysis.

An improved solution is presented for the problem of finding the smallest number of direct pairwise comparisons which will always suffice to rank n objects according to some transitive characteristic. In his book, Mathematical Snapshots, Steinhaus discusses the problem of ranking n objects according to some transitive characteristic, by means of successive pairwise comparisons. In this paper, the terminology was adopted of a tennis tournament by n players. The problem may be briefly stated: 'What is the smallest number of matches which will always suffice to rank all n players.'

AD-606 592 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON POLYNOMIAL AND SEPARABLE GAMES,
by David Gale and Oliver Gross. 14 Nov 57, rev.
16 Apr 58, 17p P-1216

Unclassified report

Descriptors: (*Game theory, Polynomials), (*Polynomials, Game theory), Topology, Optimization, Set theory, Functions, Theorems.

It is shown that, given a pair of infinite metric spaces and a pair of respective finite mixed strategies on them, there exists a separable game with bounded continuous payoff on their cartesian product such that the given strategies constitute the unique solution of the game. If he spaces are identical, then, corresponding to any given finite mixture, one can find a symmetric polynomial-like game with bounded (skew-symmetric) continuous payoff such that the given strategy is the only optimal one. A stronger conclusion holds if the spaces are bounded subspaces of Euclidean n-space with sufficiently many cluster points in their closures, in that the payoff can be a polynomial and have the desired property. (Author)

AD-606 593 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOLUME 26,
by Cecil Hastings, Jr. and Elaine Hastings.
15 Nov 57, 3p P-1217

Unclassified report

Descriptors: (*Integrals, Numerical analysis), (*Numerical analysis, Integrals), Numerical methods and procedures, Special functions (Mathematical), Trigonometry.

Analytical approximations are given for incomplete elliptic integrals.

AD-606 596 Div. 15, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPROXIMATE EVALUATION OF AN EXPRESSION ARISING IN THE THEORY OF TIME-DELAY ESTIMATION,
by P. Swerling. 23 Nov 57, 14p P-1221

Unclassified report

Descriptors: (*Wave transmission, Time-lag theory), (*Time-lag theory, Wave transmission), Mathematical prediction, Integrals, Special functions (Mathematical), Bessel functions, Errors.

In a previous paper (AD-606 542) a formula was derived for the greatest lower bound of the variance of unbiased estimates of the time delay between transmission and reception of a waveform, when the received waveform is observed in a background of additive white Gaussian noise. The present paper evaluates this expression approximately for a class of waveforms. (Author)

AD-606 600 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE COMPUTATIONAL DETERMINATION OF THE NATURE OF SOLUTIONS OF NONLINEAR SYSTEMS WITH STOCHASTIC INPUTS,
by Richard Bellman, Paul Brock, and Mikiso Mizuki.
6 Dec 57, 14p P-1226

Unclassified report

Descriptors: (*Stochastic processes, Nonlinear differential equations), (*Nonlinear differential equations, Stochastic processes), Probability, Numerical analysis, Errors, Integration, Dynamics, Programming (Computers), Integrals.

Nonlinear dynamics problems prove difficult to investigate analytically or numerically if probabilistic terms are involved in their equations. This paper develops a technique for handling problems of this type that is practical only if a high speed computer is available to perform the attendant computations. The method is general, but was applied to the Van der Pol equation.

AD-606 603 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 27,
by Cecil Hastings, Jr. and Elaine Hastings.
9 Dec 57, 4p P-1229

Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Special functions (Mathematical), Trigonometry, Series.

Analytical approximations are given for incomplete elliptic integrals.

AD-606 606 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

ANALYTICAL APPROXIMATIONS; VOLUME 24,
by Ceil Hastings, Jr. and Elaine Hastings. 27 Sep 57, 6p P-1184

Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Numerical methods and procedures, Statistical distributions.

Analytical approximations of chi-square integrals are presented.

AD-606 555 Div. 15
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE EQUIVALENCE OF CERTAIN HOMOLOGICAL DETERMINATIONS IN TOPOLOGY,
by M. F. Bokshtein. 21 Sep 64, 30p
FTD MT63 348; TT 64 71476

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Matematika (USSR) 1960, no. 3(16) p. 62-80. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Algebraic topology, Theorems), (*Groups (Mathematics), Algebraic topology), Mapping (Transformations), Set theory, Topology.

In this article there is given a direct proof of the theorem of A. N. Kolmogorov of the equivalence of internal groups of cohomologies of a local-bicompact Hausdorff space, openly embedded in the bicompactum, with relative groups of cohomologies of this bicompactum, using only the homological determinations of P. S. Aleksandrov (instead of those determinations introduced by A. N. Kolmogorov and applied by him in the note just cited, based on another idea).

AD-606 556 Div. 15, 6
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
CONFIDENCE LEVELS FOR THE SAMPLE MEAN AND STANDARD DEVIATION OF A RAYLEIGH PROCESS,
by Leo M. Keane. Sep 64, 13p
Proj. 4600
AFCRL 64 737; AFCRL PMSRP48

Unclassified report

Descriptors: (*Sampling, Demodulation), (*Statistical analysis, Stochastic processes), (*Statistical distributions, Probability), Statistical functions, Statistical processes, Scattering.

The number of independent samples necessary to characterize the parameters of a Rayleigh-distributed process within arbitrary confidence limits is derived. Stationarity of the process is assumed, along with convergence of the Central Limit theorem with regard to the probability density function of the sample mean. Perfect measurement ability is also assumed. A graph of sample size for a range of confidence coefficients and error limits is presented. (Author)

AD-606 584 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NEW APPROACH TO THE KOLMOGOROV-SMIRNOV DISTRIBUTIONS,
by D. A. Darling. 4 Oct 57, 29p P-1192

Unclassified report

Descriptors: (*Statistical distributions, Statistical processes), (*Statistical processes, Statistical distributions), Statistical functions, Distribution theory, Equations, Stochastic processes, Integral transforms, Measure theory.

The present approach is based on a combination firstly of the observation that the empirical distribution function of a sample of data is merely a scaled and normalized Poisson process, and secondly of certain analytical methods which have been developed in the past few years for calculating the distribution of certain additive functionals of Markov processes. In general the methods in this paper isolate the analytical difficulties in certain functional equations whose solution may be very difficult; but it seems quite powerful in obtaining asymptotic expansions.

AD-606 587 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS. VOLUME 25,
by Cecil Hastings, Jr. and Elaine Hastings.
28 Oct 57, 2p P-1208

Unclassified report

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Numerical methods and procedures, Statistical distributions.

Analytical approximations of chi-square integrals are presented.

AD-606 589 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EQUILIBRIUM POINTS IN GAMES WITH VECTOR PAYOFFS,
by L. S. Shapley. 15 Nov 56, 10p P-1212

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Games theory, Vector analysis), Matrix algebra, Set theory, Convex sets, Probability.

The payoff of a game sometimes takes the form of a vector having components that represent amounts of different things, such as ships, men, money, etc., of which the relative values are unknown. The purpose of this paper is to define and characterize the equilibrium-point solutions of games of this kind. (Author)

AD-606 590 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON INITIAL ESTIMATES FOR COMPUTING a(1/p) BY NEWTON'S METHOD,
by John I. Derr. 31 Jan 58, 9p P-1213

Unclassified report

Descriptors: (*Iterative methods, Sequences), (*Sequences, Iterative methods), Numbers, Polynomials, Numerical analysis, Power series, Programming (Computers), Functions, Equations.

This paper was prepared for presentation at a Mathematical Colloquim held at the RAND Corp., Santa Monica, Calif, 19 Mar 62. Prepared in cooperation with California Univ., Berkeley.

Descriptors: (*Game theory, Set theory), Topology, Functions, Mapping (Transformations), Real numbers, Numerical analysis.

This paper contains several remarks and results on the application of general theorems on infinite games with perfect information to some special games of that kind and also the games of pursuit and evasion.

AD-606 708 Div. 15
OTS Prices: HC $2.00/MF $0.50

Mathematica, Princeton, N. J.
ON FINDING INTEGER SOLUTIONS TO LINEAR PROGRAMS,
by M. L. Balinski. 1 May 64, 48p
Contract DA31 124ARO D31
AROD 4087 1

Unclassified report

Prepared in cooperation with Princeton Univ., N. J.

Descriptors: (*Linear programming, Numerical analysis), (*Numerical analysis, Linear programming), Numbers, Mathematical programming, Combinatorial analysis, Optimization, Calculus of variations, Convex sets, Transformations (Mathematics).

The primary goal of this paper was to discuss the methods - mathematical and computational - which surround the problem of finding integer solutions to linear programs. Perhaps the most important part of the paper is an up to date survey of computational experience with integer programming algorithms. It is argued that this experience should be viewed as strong encouragement for the applied mathematician seeking solutions of particular combinatorial problems to use existing programs; or better yet, to develop new codes. In any case, experience indicates that solutions to large practical problems can be found in 'reasonable' time. This is contrary to what the folklore of the field will make one believe. Furthermore, the computational experience seems to point to a number of interesting questions for the combinatorial mathematician.

AD-606 743 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON ONE EVALUATION FOR LYUSTERNIK-SHNIREL'MAN CATEGORY,
by D. P. Grossman. 25 May 64, 13p
FTD MT63 323; TT 64 71489

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Doklady, 1946, v. 54, no. 2, p. 109-112.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Algebraic topology, Theorems), Groups (Mathematics), Geometric forms, Mapping (Transformations), Set theory, Projective geometry, Topology, USSR.

Two lemmas are presented for the proof of the theorem. If the homotopic groups of the n-dimensional connected polyhedron K to the nth power are trivial to the k-th order inclusively, then the category of this polyhedron does not exceed (n/k+1) + 1.

AD-606 750 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD OF DESCRIPTIVE GEOMETRY,
V. A. Manevich. 7 Apr 64, 21p
FTD MT63 300; TT 64 71492

Unclassified report

Edited machine trans. of Matematicheskii Sbornik (USSR) 1959, v. 48(90) no. 1, p. 105-116.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Projective geometry, Theorems), (*Differential geometry, Theorems), Complex numbers, Geometry, Analytic geometry, USSR.

In this paper, the one-to-one conformity is considered between points of space and pairs of points on a plane, based on the properties of a linear complex and null system. This conformity is the basis of the given method of descriptive geometry.

AD-606 755 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
REMARKS ABOUT SOLUTIONS OF CERTAIN NONLINEAR DIFFERENTIAL EQUATIONS,
by Sheng-wang Wang. 26 May 64, 12p
FTD MT64 24; TT 64 71495

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 150, no. 5, p. 967-970.
A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Nonlinear differential equations, Calculus of variations), Functions, Equations, Complex numbers, Operators (Mathematics), Functional analysis, Inequalities.

Solutions of certain nonlinear differential equations are studied with the help of variational methods.

AD-606 762 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE REPRESENTATION OF THE COLLINEATIONS IN THE PLANE AS THE PRODUCT OF TWO CORRESPONDENCES,
by V. A. Manevich. 7 Apr 64, 8p
FTD MT63 314; TT 64 71497

Unclassified report

Edited machine trans. of Ukrainskii Matematicheskii Zhurnal (USSR) 1958, v. 10, no. 2, p. 219.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Conformal mapping, Projective geometry), (*Projective geometry, Conformal mapping), Mapping (Transformations), Differential geometry, Algebraic topology, USSR.

AD-606 801 Div. 15
OTS Prices: HC $2.00/MF $0.50

Maryland Univ., College Park.

A NOTE ON PREVENTATIVE SAMPLING,
by Robert Kalaba. 13 Dec 57, 8p P-1232
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sampling, Optimization), (*Equations, Dynamic programming), (*Dynamic programming, Equations), Numerical analysis, Partial differential equations, Operations research, Calculus of variations.

It is shown that certain optimization problems of preventative sampling may be handled advantageously using the functional equation technique of dynamic programming. (Author)

AD-606 607 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A DIFFERENTIAL INEQUALITY OF CESARI AND TURNER,
by Richard Bellman. 16 Dec 57, 6p P-1233
Unclassified report

Descriptors: (*Inequalities, Calculus of variations), (*Calculus of variations, Inequalities), Functions, Integration, Transformations (Mathematics), Mathematical logic.

This paper contains a simplified proof, and indicated generalization, of a result of Cesari and Turner, 'On a Lemma in the Direct Method of the Calculus of Variations.' (Author)

AD-606 612 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
PRIMES IN THE THOUSANDTH MILLION,
by C. L. Baker and F. J. Gruenberger. 6 Jan 58, 84p P-1245
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Prime numbers, Tables), (*Tables, Prime numbers), Numbers, Programming (Computers), Numerical methods and procedures.

An account is given of the method of calculation of a table of 47,957 prime numbers, starting with 999,000,011 and ending with 999,999,937.

AD-606 620 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON CONVERGENT PERTURBATION EXPANSIONS,
by Richard Bellman and Tomlinson Fort.
21 Jan 58, 8p P-1260
Unclassified report

Descriptors: (*Perturbation theory, Series), (*Power series, Sequences), Differential equations, Functions, Complex numbers, Transformations (Mathematics).

In this paper, consideration is given the Sturm-Liouville equation and the problem of obtaining power series expansions for the first characteristic value and function.

AD-606 623 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A GENERALIZATION OF A RESULT OF WINTNER,
by Richard Bellman. 4 Feb 58, 6p P-1271
Unclassified report

Descriptors: (*Differential equations, Theorems), Invariance, Matrix algebra, Perturbation theory, Integrals, Stability.

A generalization is obtained of the Hukuwara stability theorem analogous to a recent generalization for second order equations due to Wintner, Quarterly of Applied Mathematics, Vol. XV(1958), pp. 428-430. (Author)

AD-606 630 Div. 15, 25
OTS Prices: HC $3.00/MF $0.75

Radiation Lab., Univ. of Michigan, Ann Arbor.
ITERATIVE SOLUTIONS OF THE HELMHOLTZ EQUATION,
by R. E. Kleinman. Aug 64, 72p ORA-3648-7-T
Contract AF19 604 6655, Proj. 5635, Task 563502
AFCRL 64 684
Unclassified report

Descriptors: (*Iterative methods, Boundary value problems), (*Boundary value problems, Iterative methods), Potential theory, Green's function, Integral equations, Special functions (Mathematical).

This report presents a new approach to the solution of the problem of scalar scattering by three-dimensional finite bodies. Specifically, a method is found, of general applicability, whereby the solution of the static potential problem for a Dirichlet boundary condition on a particular surface is transformed, by successive operations, into the solution of the scalar Helmholtz equation satisfying the same boundary conditions.

AD-606 672 Div. 15
OTS Prices: HC $2.00/MF $0.50

Washington Univ., Seattle.
CURRENT PROBLEMS IN LINEAR AND CONFIGURAL PREDICTION,
by Paul Horst. Sep 64, 33p
Contract Nonr477 33; Grant PHS MH00743 08
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Mathematical prediction, Theory), Functions, Factor analysis, Statistical analysis, Statistical distributions, Configurations, Combinatorial analysis.

Contents: Mathematical functions and prediction; Configural prediction as a special case of linear prediction; and Multivariate transformation to a multinormal distribution.

AD-606 692 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONTINUOUS GAMES WITH PERFECT INFORMATION,
by Jan Mycielski. Jun 62, 16p P-2591
Grants NSF G6693, NSF G14006
Unclassified report

Descriptors: (*Series, Difference equations), (*Difference equations, Differential equations), Polynomials, Real numbers, Equations, Transformations (Mathematics), Integration, Functions.

The problem of determining the asymptotic nature of the solution of linear differential-difference equations of the form $x'(t) = A(t)x(t) + B(t)x(t-1)$, where the coefficients $A(t)$ and $B(t)$ possess asymptotic series expansions has previously been treated only under quite special conditions and by quite complicated methods. The purpose of this paper is to present a new technique which will yield more comprehensive results. To illustrate the method, unhindered by analytic details, the author considers the scalar version of the foregoing equation and treat only the asymptotic series of the solution associated with the characteristic root of largest real part.

AD-606 859 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUNCTIONAL EQUATIONS IN THE THEORY OF DYNAMIC PROGRAMMING. IX. VARIATIONAL ANALYSIS, ANALYTIC CONTINUATION, AND IMBEDDING OF OPERATORS,
by Richard Bellman and Sherman Lehman. 7 Apr 58, 6p P-1331

Unclassified report

Descriptors: (*Equations, Dynamic programming), (*Dynamic programming, Equations), (*Operators (Mathematics), Calculus of variations), Identities, Mathematical programming, Green's function.

In this paper it is shown how variational techniques can be applied to deduce properties for complex operators and for operators which are non-symmetric. For complex operators use is made of a min-max variation and analytic continuation, if necessary, while for non-symmetric operators an imbedding technique was used, along with analytic continuation when required. A non-symmetric operator is imbedded within a family of symmetric operators associated with a variational problem. Once the variational problem has been formulated one can apply the functional equation techniques of the theory of dynamic programming.

AD-606 860 Div. 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUNCTIONAL EQUATIONS IN THE THEORY OF DYNAMIC PROGRAMMING. X. RESOLVENTS, CHARACTERISTIC FUNCTIONS AND VALUES,
by Richard Bellman and Sherman Lehman. Revised 14 Nov 58, 30p P-1332

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-606 378.

Descriptors: (*Dynamic programming, Equations), Functions, Operators (Mathematics), Vector algebra, Matrix algebra, Partial differential equations, Boundary value problems, Green's function.

AD-606 861 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
APPROXIMATION IN POLICY SPACE, LINEAR AND NONLINEAR PROGRAMMING,
by Richard Bellman. 7 Apr 58, 8p P-1333

Unclassified report

Descriptors: (*Linear programming, Numerical analysis), (*Nonlinear programming, Numerical analysis), (*Quadratic programming, Numerical analysis).

QUASI-SEPARABLE SOLUTIONS OF SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS. I. ELLIPTIC CASE,
by S. Levin and M. H. Martin. 1 Sep 64, 26p
Grant DA ARO D31 124G563, Projs. 20011501B704, 407M AROD 407 66

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Partial differential equations, Theory), Functions, Complex variables, Boundary value problems, Integration, Differential equations.

The primary topic of this report is the elliptic case of quasi-separable solutions of systems of partial differential equations. It is proved that every quasi-separable function F can be expressed in terms of a separable function H, and using this method a compact representation for the desired solution is obtained. (Author)

AD-606 842 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
STABILITY THEORY AND ADJOINT OPERATORS FOR LINEAR DIFFERENTIAL-DIFFERENCE EQUATIONS,
by Richard Bellman and K. L. Cooke. 14 Feb 58, 64p P-1280

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Operators (Mathematics), Difference equations), (*Difference equations, Differential equations), Stability, Theory, Real variables, Matrix algebra, Perturbation theory, Integral equations, Functions, Invariance.

This paper extends to linear differential-difference equations a number of results familiar in the stability theory of ordinary linear differential equations. In this theory, one considers a system of equations of the form (1) $dx/dt = A(t)x$, $x(0) = c$, where t is a real variable, x is a column vector with n rows, and A(t) is an n- by -n matrix, and a perturbed system (2) $dx/dt = (A(t) + B(t))x$. In general terms, the stability problem is to determine conditions on the matrix B sufficient to ensure that some property of all solutions of (1)- such as boundedness or order of growth - will also be a property of all solutions of (2).

AD-606 843 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A LINEAR PROGRAMMING-COMBINATORIAL APPROACH TO THE TRAVELING SALESMAN PROBLEM,
by G. B. Dantzig, D. R. Fulkerson, and S. M. Johnson. Rev. 16 Apr 58, 14p P-1281

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Linear programming, Combinatorial analysis), (*Combinatorial analysis, Linear programming), Decision theory, Optimization.

AD-606 844 Div. 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
COMBINATORIAL PROCESSES AND DYNAMIC PROGRAMMING,
by Richard Bellman. 24 Feb 58, 68p P-1284

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dynamic programming, Combinatorial analysis), (*Combinatorial analysis, Dynamic programming), Set theory, Numerical analysis, Linear systems, Nonlinear systems, Equations, Functions.

The purpose of the paper is to discuss the application of dynamic programming techniques to a class of problems which for want of a better term are called combinatorial.

AD-606 849 Div. 15
OTS Prices: HC $1.00/MF$0.50

RAND Corp., Santa Monica, Calif.
ANALYTICAL APPROXIMATIONS, VOL. 28,
by Cecil Hastings, Jr. and Elaine Hastings.
4 Mar 58, 8p P-1301

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Numerical analysis, Integrals), (*Integrals, Numerical analysis), Numerical methods and procedures, Statistical processes, Errors, Integral equations.

Analytical approximations of Gaussian error integrals are presented.

AD-606 851 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON 'SOLUTION OF THE QUOTA PROBLEM BY A SUCCESSIVE-REDUCTION METHOD' BY D. F. VOTAW, JR.,
by D. R. Fulkerson and D. Gale. 20 Mar 58, 6p P-1315

Unclassified report

Descriptors: (*Linear programming, Iterative methods), (*Iterative methods, Linear programming), Scheduling, Feasibility studies, Numerical analysis, Personnel.

It is pointed out that the 'Quota Problem' as described by D.F. Votaw, Jr., in JORSA, Vol. 6, No. 1, can be looked upon as a special kind of maximum flow problem. As such it can be solved more efficiently by the methods of Ford and Fulkerson than by the reduction method proposed by Votaw. (Author)

AD-606 852 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ASYMPTOTIC SERIES FOR THE SOLUTIONS OF LINEAR DIFFERENTIAL-DIFFERENCE EQUATIONS,
by Richard Bellman. Rev. 2 May 58, 16p P-1316

Unclassified report

The prime objective was to ascertain the functional significance of sound production in a variety of fishes. In order to understand any animal communication system thoroughly it is necessary to consider the ecological and physiological controls of sound production, hearing and behavior. A second requisite is to select animals that are good experimental subjects. Many sound producing fish are not but toadfish, squirrelfish, a freshwater minnow, the croaking gourami and the fiddler crab do exhibit acoustic behavior under conditions that allow for detailed study. A start has also been made in a study of the orientation mechanisms of one group of fishes. Finally we should be able to comprehend more fully the perceptual world of aquatic animals through an understanding of how the sense organs and central nervous system records and transmits information. The report is organized so that summaries of papers either published or in press are given first. After that briefer summaries are given of work in the experimental or analysis stage. (Author)

AD-606 408 Div. 16, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SYSTEM CONSIDERATIONS IN REGIONAL INFORMATION EXCHANGE,
by Edward F. R. Hearle. Nov 62, 11p P-2662
Unclassified report

Prepared for presentation at the New England Conference on Community Health Records Management, Boston, Mass., 16 Nov 62.

Descriptors: (*Symposia, Public health), (*Public health, Data processing systems), Medical research, Social sciences, Data storage systems, Information retrieval, Statistical data, Input-output devices, Systems engineering, Population.

The widespread interest in improved systems for regional exchange of health, medical and welfare information arises for two major reasons. First it appears that substantial advances in both research and patient care might be achieved if the volumes of valuable data buried in files of health, medical, and welfare agencies were more accessible. Second, electronic devices offer real promise of making better access to such data technologically feasible. This paper expands on both of these reasons and explores some of the considerations in designing systems for regional information exchange.

AD-606 504 Div. 16, 4
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
ENZYME SYSTEMS IN PHOTOSYNTHESIS.
Final rept.,
by Daniel I. Arnon. 1 Jul 64, 9p
Contract Nonr222 27, Proj. NR108 268
Unclassified report

Descriptors: (*Enzymes, Photosynthesis), (*Photosynthesis, Enzymes), Adenosine phosphates, Pyridines, Nucleotides, Solar radiation, Carbohydrates, Oxygen, Carbon dioxide, Phosphorylation, Reaction kinetics, Electrons, Photochemistry, Bacteria, Plants (Botany).

The distinction between photosynthetic and nonphotosynthetic cells lies in the manner in which ATP and PNH2, needed for carbon assimilation, are formed. Photosynthetic cells form these compounds at the expense of radiant energy whereas nonphotosynthetic cells form them at the expense of energy released by dark chemical reactions. Thus, the key problem of photosynthesis is how the photosynthetic apparatus converts the sun's radiant energy into the chemical energy of ATP and PNH2. This is the area with which this project has been concerned. Work was begun on the premise that in photosynthesis, as was the case earlier in fermentation and respiration, the elucidation of the partial reactions and mechanisms of energy conversion would most likely come when the process was reconstructed outside the intact cell. The work, therefore, was concentrated on developing effective biochemical techniques for carrying out photosynthesis outside the cell.

AD-606 505 Div. 16, 3
OTS Prices: HC $1.00/MF $0.50

Western Reserve Univ., Cleveland, Ohio.
PERCUTANEOUS ABSORPTION.
Final rept.,
by Richard B. Stoughton. 16 Dec 63, add.
15 Mar 64, 22p
Contract DA18 108 405cm1215
Unclassified report

Descriptors: (*Skin, Absorption (Biological)), (*Chemical warfare agents, Absorption (Biological)), Nicotinic acid, Electrolytes, Vasoactive agents, Oxidoreductases, Transferases, Inhibition, Antimetabolites, Steroids, Salicylic acids, Parasympatholytic agents, Films, Plastics, Integumentary system, Penetration.

A summary is given of studies concerning various aspects of the absorption of biologically active substances through the human skin.

AD-606 517 Div. 16, 32
OTS Prices: HC $4.00/MF $0.75

Institute of Contemporary Russian Studies, Fordham Univ., New York.
SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS, SER. II, NO. 5,
comp. by Robert Pollitzer. May 64, 108p
Contract DA18 108 405CML867A
TT 64 71478
Unclassified report

Descriptors: (*Microbiology, USSR), (*USSR, Microbiology), (*Abstracting, Microbiology), Immunity, Vaccines, Rickettsia, Viruses, Diseases, Antigens and antibodies, Ticks, Arboviruses, Insects, Animals, Rodents, Ecology, Bacteria, Epidemiology, Pasteurella, Antibiotics, Bibliographies.

Selected abstracts from Soviet biomedical journals are listed. Topics include immunology, epidemiology, bacteriology, virology, and microbiology.

AD-606 521 Div. 16
OTS Prices: HC $1.00/MF $0.50

Duke Univ., Durham, N. C.
STUDY OF THE DYNAMICS OF THE LUNG-THORAX SYSTEM.
Final rept.,
by Wayland E. Hull and E. Croft Long. 15 May 64, 12p
Contract Nonr1181 07 Task 102 416
Unclassified report

Descriptors: (*Respiratory system, Dynamics), Lungs, Thorax, Trachea, Bronchi, Respiration, Gas flow, Laminar flow, Turbulence, Pressure, Infants, Dogs, Heart, Esophagus, Body temperature, Tissues (Biology), Resistance (Electrical), Mechanics, Mathematical models, Digital computers.

16. Medical Sciences

AD-606 158 Div. 16, 3
OTS Prices: HC $1.00/MF $0.50

Army Chemical Research and Development Labs., Edgewood Arsenal Md.
METABOLITES OF PINACOLYL METHYLPHOSPHONOFLUORIDATE (GD) FOLLOWING ENZYMATIC HYDROLYSIS IN VITRO.
Rept. for Dec 62-Nov 63,
by Larrel W. Harris, Leon W. Braswell, Jr., Joseph H. Fleisher, and William J. Cliff. Jul 64, 22p
Task 1C622401A09705
CRDLR 3216

Unclassified report

Descriptors: (*Cholinesterase inhibitors, Metabolism), (*G agents, Metabolism), (*Soman, Metabolism), Nerve agents, Organic phosphorus compounds, Hydrolysis, Enzymes, Labeled substances, Phosphonic acids, Blood plasma, Liver.

Analytical procedures for the characterization and quantitative estimation of phosphonic acids derived from GD, based upon paper chromatography and partition between isobutanol-benzene and an aqueous phase, were developed. By using P32-labelled phosphonic acids, as little as .01 micromole acid could be determined. Application of these methods to the enzymatic hydrolysis products of GD suggests that the principal, if not the only, metabolite of GD incubated with rat plasma or liver tissue in vitro is pinacolyl methylphosphonic acid. (Author)

AD-606 180 Div. 16, 15
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A GENERAL USE OF THE POISSON APPROXIMATION FOR BINOMIAL EVENTS, WITH APPLICATION TO BACTERIAL ENDOCARDITIS DATA.
Scientific rept.,
by H. B. Eisenberg, R. R. M. Geoghagen, and J. E. Walsh. 26 Aug 64, 14p SP-1256/000/02

Unclassified report

Descriptors: (*Medical research, Statistical analysis), (*Infections, Probability), (*Probability, Infections), Statistical analysis, Bacteria, Diseases, Heart, Mathematical prediction, Penicillins, Streptomycin, Life span, Statistical distributions.

Use of past data to predict future results is the goal of much medical research. Unfortunately, even partial attainment of this goal is ordinarily difficult. For two special types of situations involving binomial events, however, usable methods can often be developed. Let success and failure denote the outcomes for an event. Estimation of the distribution for the number of successes is considered for new groups containing at least moderately large numbers of events. The probabilities of success (not necessarily equal) are known to be small for one of the special situations. The failure probabilities are small for the other special situation. For each situation, a Poisson approximation to the distribution can often be used, even for mild dependence among the events. Estimation of the distribution is then reduced to estimation of a parameter that has an elementary interpretation. The estimation method developed contains adjustment factors to allow for differences between the new group and the past data. Cases where the special situations both occur are also considered. Stratification of characteristics is used to obtain events of the two special types and to relate past data to these events. This methodology was originally developed for a mortality study of persons who had bacterial endocarditis. (Author)

AD-606 326 Div. 16, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECOLOGICAL PROBLEMS AND POSTWAR RECUPERATION: A PRELIMINARY SURVEY FROM THE CIVIL DEFENSE VIEWPOINT,
by H. H. Mitchell. Aug 61, 46p RM-2801-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Ecology, Civil defense systems), (*Civil defense systems, Ecology), Food, Animals, Growth, Reproduction (Physiology), Radiological contamination, Radioactive fallout, Radiation damage, Decontamination, Forest fires, Agriculture, Population, Plants (Biology), Bacteria, Fungi, Mutations, Nuclear warfare.

This document calls attention to the need for assessing and solving ecological problems in the post-attack environment as an integral part of Civil Defense. Basic ecological principles involving food chain relationships, climax growth, biological and environmental relationship, and land management are considered. The large-scale damage due to fire, drought, flood and other things has already presented the world with problems of reconstruction and reconstitution of biotic communities which are similar to those envisioned in the post-attack environment. The only qualitatively new element in the post-attack situation will be the effects of radiation. The available information on this subject is summarized and the need for extensive further research is pointed out. (Author)

AD-606 345 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naples Univ. (Italy).
STUDIES ON THE COENZYMATIC ROLE OF PYRIDOXAL-5-PHOSPHATE.
Final technical rept. for 1 Sep 63-31 Aug 64,
by V. Scardi. 31 Aug 64, 10p
Contracts DA91 591EUC2902, DA91 591EUC2249
continuation

Unclassified report

Descriptors: (*Transferases, Chemical properties), (*Coenzymes, Phosphates), Enzymes, Purification, Chemical analysis, Aspartic acid, Brain, Heart, Amino acids, Anoxia, Bovines, Swine, Rats.

Contents:
Purification and properties of aspartate aminotransferase from ox brain; Specificity of aspartate aminotransferase of pig heart; Effect of anoxia on aspartate aminotransferase in the new-born rat. (Author)

AD-606 346 Div. 16
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
BIOLOGICAL PROBLEMS IN ACOUSTIC SYSTEMS (BEHAVIOR OF FISHES WITH SPECIAL REFERENCE TO THEIR SENSORY CAPACITIES).
Final rept.,
by Howard E. Winn, Anthony Picciolo, Michael Salmon, John Stout, and Nicolas Roberts. Aug 64, 13p
Contract Nonr595 09, Proj. NR104 489

Unclassified report

Descriptors: (*Sound signals, Fishes), (*Fishes, Sound signals), (*Reproduction (Physiology), Fishes), Auditory signals, Auditory perception, Sounds, Behavior, Crustacea, Males, Females, Ecology, Hormones, Colors, Visual signals, Ecology, Hearing, Stimulation.

95 per cent of those in the thymus and a major percentage of those in the spleen are short lived (five days or less). Evidence is presented which suggests that the long-lived lymphocyte plays an active role in immune response mechanisms. (Author)

AD-606 691 Div. 16
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PHYSICOCHEMICAL CHARACTERISTICS OF PLACENTAL TRANSFER,
by J. C. DeHaven, E. C. DeLand, N. S. Assali, and W. Manson. Mar 62, 34p P-2565

Unclassified report

This paper was prepared for presentation at the Symposium on Biomedical Engineering to be held in San Diego, Calif., 19-21 Jun 62. Prepared in cooperation with California Univ., Los Angeles.

Descriptors: (*Pregnancy, Biochemistry), (*Embryos, Respiratory system), (*Respiratory system, Mathematical models), Reproductive system, Blood circulation, Membranes (Biology), Respiration, Oxygen, Carbon dioxide, Hemoglobin, Females, Chemical reactions, Lungs, Ph, Blood vessels.

A biophysicochemical model of certain maternal-fetal circulatory and metabolic relations was constructed for the purpose of a rigorous extra-uterine study of the transfer of respiratory gases and other elements across the placental membrane. The model was subsequently analyzed by a mathematical method for the minimization of a chemical free-energy function subject to constraints relating to mass, charge and phase transfer. As a preliminary investigation of the placental phenomenon, the model was applied to the representation of the exchanges of respiratory gases occurring between the venous and arterial sides of the total air-blood system. The model indicates a greater acidity for the fetal than for the maternal erythrocite intracellular medium. This feature, combined with other aspects of the results, could explain the lower oxygen saturation of fetal hemoglobin in utero, and also suggests that the fetal oxygen environment is not so inimical or stressful to the fetus as previously hypthesized. (Author)

AD-606 800 Div. 16
OTS Prices: HC $2.00/MF $0.50

Walter Reed Army Inst. of Research, Washington, D. C.
CHROMOSOMAL ANALYSES OF CHILDREN WITH MULTIPLE CONGENITAL MALFORMATIONS.
Progress rept. for Sep 63-Jul 64,
by Robert G. Scherz. Jul 64, 30p
Proj. 3A012501A808

Unclassified report

Descriptors: (*Children, Anomalies), (*Anomalies, Chromosomes), (Chromosomes, Anomalies), Genetics, Morphology (Biology), Pathology, Diseases, Infants, Mental disorders, Medical examination, Leukocytes, Blood analysis, Radiation effects, Military personnel, Military medicine, Medical laboratories, Tables.

Ninety-five patients with multiple congenital anomalies have had chromosomal analyses performed on peripheral blood leucocytes. Seventy-five had detectable chromosome anomalies in this select group. Chromosomal analyses thus far are useful for establishing and confirming clinical diagnoses, aid in genetic counseling, and are useful tools for probing deeper into the causations of multiple congenital malformations. This sample of patients is biased by the selective population referred to Walter Reed General Hospital for consultation. However, it is obvious that chromosomal disorders are present in the military and dependent populations at this time, and that although uncommon, they certainly are not rare. Radiation may be important in the production of chromosomal diseases. It is important to note that chromosomal abnormalities can be readily detected in the dependent populations of servicemen who have been unduly exposed to more than background radiation and diagnostic x-radiation thus far.

AD-606 802 Div. 16, 12, 28
OTS Prices: HC $3.00/MF $0.75

Duntley (S. Q.), La Jolla, Calif.
SURVEY OF RESEARCH RELATING TO MAN'S VISUAL CAPABILITIES IN SPACE FLIGHT.
Final rept.,
by John H. Taylor. Jun 64, 81p
Contract NObs86012

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Visual perception, Astronauts), (*Space environmental conditions, Vision), (*Visual acuity, Space flight), Performance (Human), Space navigation, Spacecraft docking, Rendezvous spacecraft, Lunar environment, Planets, Space maintenance, Acceleration, Vibration, Weightlessness, Gravity, Pressure, Brightness, Color vision, Radiation hazards, Toxic tolerances, Magnetic fields, Space perception, Sensory deprivation.

The survey is intended to provide an overview of the status of our knowledge of man's probable capabilities and limitations in the performance of visual tasks in operations now foreseen as part of the space program. All phases of space travel are considered, from initial launch through various inflight tasks, lunar and planetary exploration, relaunch from an extraterrestrial body, and eventual return to earth. Where alternative procedures are known to be possible, as in spacecraft recovery, for example, the optional procedures are considered. The particular qualities of the astronaut's subenvironment during various space operations may be of cardinal importance to his visual performance; in those instances where the environmental factors are known or may be reasonably predicted specific research has been adduced.

AD-606 811 Div. 16
OTS Prices: HC $2.00/MF $0.50

Pacific Marine Station, Dillon Beach, Calif.
A GUIDE TO SOME TOMALES BAY POLYCHAETES,
by William M. Shepherd. 15 Jun 64, 44p
Contract Nonr3002 02, Proj. NR104 628

Unclassified report

Descriptors: (*Marine biology, California), (*Annelida, Marine biology), Aquatic animals, Marine borers, Worms, Identification, Bays.

The polychaete collection of the Pacific Marine Station presently includes ninety one species from twenty nine families. Of this total ninety species have been confirmed by Dr. Olga Hartman. Most of the collection comes from intertidal and subtidal stations in the White Gulch area. Most of the remainder are intertidal species from the Lawson's Flat area, and a few species are from the sandy beach or rocky intertidal at Dillon Beach and from Tomales Point. This guide is intended to help in the clarification of a few of the more puzzling problems of identification with respect to the present PMS collection.

The objectives of the research were to study and define the factors which govern the motion of the thoraco-abdominal system and which contribute to the total opposition to ventilation of the lungs. A summary of the experimental program is presented. Topics include: (1) Early experiments; (2) Studies using analog computers; (3) Critical tracheal volume-flow in dogs and infants; (4) Atrial and esophageal pressure measurements in forced respiration; (5) Mechanical aspects of panting as a respiratory maneuver; (6) Respiratory dynamic resistance; (7) Evaluation of the equation of motion of the respiratory system; (8) Interpretation of respiratory pressure-volume Lissajous figures; (9) Changes of thoraco-abdominal resonant frequency with driving pressure; and (10) Status of research at time of this report.

AD-606 553 Div. 16, 4, 15
OTS Prices: HC $2.00/MF $0.50

New York State Univ., Stoney Brook. Coll. of Engineering.
KINETICS OF PROTEIN SYNTHESIS BY POLYRIBOSOMES,
by I. Gerst and S. N. Levine. 1963, 39p
Contract Nonr4006 00; Grant AF AFOSR667 64
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Proteins, Synthesis (Chemistry)), (*Ribosomes, Biochemistry), Ribonucleic aicds, Polymerization, Reaction kinetics, Mathematical models, Linear systems, Differential equations, Integral transforms.

The report investigates the kinetics of polyribosome mediated protein synthesis. A fairly general but still tractable deterministic linear model is presented which allows for messenger RNA sources of arbitrary functional form and also takes into account any deterioration of the messenger RNA which may occur during the course of protein synthesis. (Author)

AD-606 638 Div. 16, 26
OTS Prices: HC $1.00/MF $0.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE USE OF DETECTORS AND TEST KITS IN INDUSTRIAL HYGIENE INVESTIGATIONS,
by J. Brennan Gisclard. 1959, 13p
Unclassified report

Presented at the Annual Meeting of the Industrial Hygiene Foundation (24th), Mellon Institute, Pittsburgh, Pa., 28 Oct 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air pollution, Test equipment), (*Industrial medicine, Air pollution), Air intake filters, Industries, Safety, Pumps, Solutions, Liquid filters, Paper, Colorimetric analysis, Toxicity, Public health, Hydrazine, Monitors.

The streamlining of conventional air sampling equipment to facilitate sample collection and thereby aid industrial hygiene investigations has been accompanied by a noted increase in the output of detectors and test kits. Although detectors and test kits embrace a broad category of sampling devices, the basic instrument discussed here consists of two parts: (a) the sampler, or mechanical device for drawing the air to be tested through the detecting or collecting medium and (b) the detecting or collecting medium. The principal types of samplers are (1) electrical pumps, (2) metal hand pumps, (3) gas aspirating devices, (4) rubber bulbs or bellows and (5) glass syringes. All of these devices are usually calibrated in advance and are intended to be used in a manner that will cause a known volume of air to pass through the detecting medium. The most widely used types of detecting or collecting mediums consist of (1) prepared solutions (2) special papers or filters impregnated with selected reagents in advance or at the sampling site and (3) solid granules such as silica gel, diatomaceous earth or alumina impregnated with selected reagents.

AD-606 660 Div. 16
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME EFFECTS OF RADIATION ON MAN,
by Howard Laitin. Nov 61, 19p P-2523
Unclassified report

Presented at UCLA and before various Military Reserve groups in the Los Angeles area in November and December 1961.

Descriptors: (*Radiation effects, Humans), Partial body irradiation, Whole body irradiation, Radiological dosage, Radiation sickness, Radiation injuries, Radioactive fallout, Cells (Biology), Tissues (Biology), X rays, Gamma rays, Neutrons, Ionization, Infections, Lethal dosage, Sublethal dosage, Neoplasms, Leukemia, Convalescence, Radiobiology.

Radiation effects upon the human organism are described. The discussion includes somatic or total body effects resulting from injury at the biochemical and cellular level. Whole-body exposure to penetrating ionizing radiation--X rays, gamma radiation, and neutron radiation--is considered as well as recovery and long term effects.

AD-606 684 Div. 16
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle.
RECIRCULATION OF LYMPHOCYTES,
by N. B. Everett, Ruth W. Caffrey, and W. O. Rieke. Jul 64, 20p
Contract AF41 657 309, Proj. 8237, Task 823702
AAL TDR63 17
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lymphatic system, Lymphocytes), (*Lymphocytes, Blood circulation), Lymph, Spleen, Thymus, Bone marrow, Body weight, Immunity, Vaccines, Hemopoietic system, Reticulo-endothelial system, Desoxyribonucleic acids, Injection (Medicine), Labeled substances.

The long-lived small lymphocyte population of the rat includes approximately 90 per cent of the cells which appear in thoracic duct lymph. About two-thirds of the small lymphocytes in blood are long-lived. These long-lived cells are produced at a rate proportional to body growth and recirculate from blood to lymph. Although a major percentage of the small lymphocytes in lymph nodes and a smaller percentage of those in spleen are of the long-lived variety, the thymus may be their primary source of origin. The small lymphocytes in the bone marrow, approximately

17. Metallurgy

AD-606 217 Div. 17, 30
OTS Prices: HC $5.00/MF $1.00

Ohio State Univ., Columbus. Research Foundation.
RESEARCH TO DEVELOP METHODS FOR MEASURING THE PROPERTIES OF PENETRANT FLAW INSPECTION MATERIALS.
Rept. for Mar 62-20 Nov 63,
by Roy B. McCauley and Quentin Van Winkle. Feb 64, 156p
Contract AF33 616 6420, Proj. 7381, Task 738102
WADD TR60 520, P4

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fracture (Mechanics), Metallography), (*Metallography, Fracture (Mechanics)), Penetration, Liquids, Surface tension, Optical properties, Chromium, Electroplating, Fluorescence, Fractography, Viscosity, Nickel, Metals.

The work covered in this report is a continuation of the investigations reported in Parts I, II, and III. The work of Part IV was aimed particularly at measurement. Here the theoretical studies were to be consolidated in such a manner that the results of the prior investigations could be employed to determine the success or relative success of the penetrant inspection system and its materials. Measurements were made concerning the luminous emission of penetrants as well as the effect of the signals produced by developers. A simple photometer was devised to do this task simply and efficiently. It was also necessary to combine the prior theory with the present simple procedure for measurement. Production of cracked metal test specimens had to reach a final reproducible stage at which specific cracked specimens were selected to develop the needs of the measurement program. Final correlation proved the need for a greatly revised cleaning program prior to penetrant testing. At this point a standard cracked plate treatment was devised including the programs of cleaning, penetration, and washing (either by emulsifier or not) in a standard manner. Both parallel and random cracked specimens were employed.

AD-606 218 Div. 17, 27
OTS Prices: HC $3.00/MF $0.75

Army Missile Command, Redstone Arsenal, Ala.
MECHANICAL BEHAVIOR OF NORMALIZED COLD-DRAWN AISI 4340 STEEL UNDER BIAXIAL STRESS AND RAPID HEATING,
by C. W. Austin, Jr. 16 Jul 64, 99p
Projs. 1B242104D226, 1A024401A110
AMC-RA RR-TR64 13

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Steel, Deformation), (*Deformation, Steel), Heat treatment, Cold working, Stresses, Loading (Mechanic Test equipment, Test methods, Pipes, Mathematical analysis, Rocket cases.

This report presents a description of test apparatus and experimental procedures for the determination of the biaxial deformation behavior of metallic materials under rapid heating conditions. The results of tests on tubular test specimens of normalized cold-drawn AISI 4340 steel subjected to uniaxial tension and to tension-tension (axial: tangential) biaxial stress ratios of 2:1, 1:1, and 1:2 are given. In general, increasing the heating rate delays specific amounts of plastic deformation to higher temperatures for biaxial stress ratios of 1:0, 1:1, and 1:2, but has little influence on the temperatures at which plastic deformation occurs for the 2:1 biaxial stress ratio. The deformation behavior for the 1:1 and 1:2 stress ratios may be predicted from uniaxial test data for plastic strains up to 2 percent while that for the 2:1 biaxial stress ratio may be predicted only for plastic strains of less than 0.5 percent. (Author)

AD-606 257 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BEHAVIOR OF STEEL DURING PULSATING LOADING BEYOND THE LIMIT OF FLUIDITY,
by T. Sh. Chernis. 23 Dec 63, 19p
FTD MT63 157, TT 64 71457

Unclassified report

Edited machine trans. of A kademiya N auk Kazakhskoi SSR, Alma Ata. Izvestiya. Seriya Matematiki i Mekhaniki, 1962, no. 10(14) p. 98-105. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Steel, Deformation), (*Loading (Mechanics), Steel), Vibration, Frequency, Plasticity, Creep.

Pulsating loading significantly increases the deformability of materials. A pulsating load significantly lowers the forces necessary for deformation of materials. Frequency has an influence on the magnitude of deformability of steel. Deformability of steel depends both on the composition of the material, and also on its original structure.

AD-606 278 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STRESS-RUPTURE STRENGTH OF STEEL IN LIQUID SODIUM CONTAINING OXYGEN,
by V. I. Nikitin. 6 Dec 63, 14p
FTD MT63 146; TT 64 71458

Unclassified report

Edited machine trans. of Fizika Metallov i Metallovedenie (USSR) 1962, v. 14, no. 4, p. 613-617. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Steel, Loading (Mechanics)), (*Loading (Mechanics), Steel), Stresses, Rupture, Chromium alloys, Nickel alloys, Austenite, Maraging steels, Air, Sodium, Liquid metals, Creep, Corrosion, Temperature, Oxygen, Microstructure.

Results of testing chromium-nickel austenitic steel for stress-rupture strength at 700 degrees in air and in sodium, containing 0.01 and 0.25 weight % O2 are presented. The lowering of time prior to the rupture and increase in rate of creep of steel in sodium with 0.25% O2 in comparision with an air medium is fixed. The observed effects are explained by corrosive and absorptive effect of the medium.

It is by no means intended to be a key to Tomales Bay polychaetes, but used in conjunction with the Hartman literature, the two principal Berkeley and Berkeley papers (1948 and 1952), and the Johnson polychaete paper (1897), this Guide to Some Tomales Bay Polychaetes should be helpful in working with the present PMS collection.

AD-606 830 Div. 16
OTS Prices: HC $3.00/MF $0.75

Santa Rita Technology, Inc., Menlo Park, Calif.
COMMUNICATION WITHOUT (CONVENTIONAL ELECTRO-MECHANICAL) ACOUSTIC TRANSDUCERS.
Rept. for 1 Jun 63-30 Sep 64,
by Robert L. Lucas, John L. Stewart, and E. James Kreul. 30 Sep 64, 84p
Contract AF33 657 11591, Proj. 4335, Task 433506
AL TDR64 243 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Speech recognition, Touch), (*Touch, Speech recognition), Speech representation, Transducers, Hearing, Sensory perception, Hands, Skin, Vibrations, Wiring diagrams.

Touch and vibration sensations accompanying the act of speaking provide a series of typical afferent neural signals associated with speech. These sensations can be evoked at other locations on the body by electro-mechanical transducers. Substitute tactile sensations are subjectively acceptable in lieu of their real counterparts, and the tactile recognition of a speech-form is accomplished by association when artificial 'speech-taction' is generated in the palmar surface of the hand. Palmar stimulation is effected with pulses of electrical energy transduced to mechanical form, which in turn produce epidermal strain analogous to the subjectives tactile sensations of speech. Real-time speech-taction is anticipated as a future reality through the use of an analog ear which will reduce the spoken word to its primary elements of intelligibility and construct from them speech-compatible taction. (Author)

Contract AF33 657 10751, Proj. 7351, Task 735103
ASD TDR62 734 P2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nickel alloys, Dispersion hardening), (*Alloys, Dispersion hardening), (*Dispersion hardening, Alloys), (*Copper alloys, Dispersion hardening), Carbides, Titanium alloys, Carbon alloys, Boron alloys, Powder metallurgy, Electron microscopy, Refractory materials, Oxides, Aluminum compounds, Borides, Aging (Materials), Tensile properties, Aluminum alloys, Strain (Mechanics), Oxidation, Microstructure, Titanium compounds.

In an effort to produce dispersion-strengthened alloys with more versatile strength properties than those reported for oxide dispersion strengthened systems, the systems Ni-TiC and Ni-TiB2 were studied. Diffusion couples of dilute alloys of Ni-C and Ni-Ti as well as of Ni-B and Ni-Ti were studied to determine the conditions necessary for the formation of a fine dispersion of TiC and TiB2 in nickel. TiB2 was found to be unsuitable for this type of application. Nickel-base alloys with a dispersion of TiC were prepared by several powder metallurgical techniques as well as by internal carburization of Ni-Ti chips. The mechanical properties of these alloys were studied at room temperature and 815C and a comparison made with the properties of conventional alloys reported for these temperatures. Transmission electron microscopy was used to study the elastic strain fields associated with dispersoid particles in the Ni-Al2O3 and Cu-Al2O3 systems, prepared by internal oxidation. (Author)

AD-606 516 Div. 17, 26
OTS Prices: HC $3.00/MF $0.75

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM.
Interim technical engineering rept. no. 4, 15 Apr-15 Jul 64,
by F. S. Turner. Aug 64, 60p
Contract AF33 657 11261
RTD TR8 109 IV

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Extrusion, Tantalum alloys), (*Tantalum alloys, Pipes), (*Pipes, Tantalum alloys), Presses (Machinery), Tungsten alloys, Carbon alloys, Hafnium alloys, Dies, Mandrels, Machine tools, Microstructure.

Data obtained from the initial breakdown extrusion of the T-222 alloy are presented. The extrusion to 2.060-inch O.D. by 1.440-inch I.D. tube hollow of both the Ta-10W and T-222 alloys has been achieved from a 5-inch liner on a 2,200-ton press. Extrusion data and photographs of the tube hollows in the as-extruded condition are presented. The T-222 alloy proved to be the stiffer and more difficult to extrude. (Author)

AD-606 552 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
ROTATING BEAM FATIGUE AND CORROSION FATIGUE PROPERTIES OF ALUMINUM AND MAGNESIUM ALLOYS,
by Clarence W. Austin. 20 Feb 58, 24p
AMC-RA DS-TN-169

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aluminum alloys, Fatigue (Mechanics), (*Magnesium alloys, Fatigue (Mechanics)), (*Fatigue (Mechanics), Beams (Structural)), (*Corrosion, Stresses), Sea water, Rotation, Loading (Mechanics), Failure (Mechanics), Experimental data.

The S-N curves indicate that the materials in order of decreasing fatigue resistance at all stress levels are: 2014-T6, 2024-T4, 5086-H34, 5052-H34, 5052-H32, and AZ 31B. The fatigue resistance of the heat treated aluminum alloys, 2014-T6 and 2024-T4, is much superior to the fatigue resistance of the strain hardened alloys, 5086-H34, 5052-H34, and 5052-H32. The S-N curves for the corrosion fatigue tests indicate that the materials in order of decreasing corrosion fatigue resistance at stresses up to 150 percent of their endurance limits are: 5086-H34, 5052-H34, 2024-T4, 2014-T6, 5052-H32, and AZ 31B. In this stress range, 5086-H34 aluminum is much superior to the other materials. At stresses above 150 percent of their endurance limits, the materials in order of decreasing corrosion fatigue resistance are: 2014T6, 2024T4, 5086-H34, 5052-H34, 5052-H32, and AZ 31B. The corrosion fatigue resistance of AZ 31B was very poor at all stresses. (Author)

AD-606 565 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
TUNGSTEN/TUNGSTEN-RHENIUM THERMOCOUPLES IN A CARBON ATMOSPHERE,
by Raymond L. Farrow and Albert P. Levitt. Jul 64, 36p
Proj. 1A024401A11003
AMRA TR64 12

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Thermocouples, High-temperature research), (*Tungsten, Thermocouples), (*Tungsten alloys, Rhenium alloys), Wire, Controlled atmospheres, Carbon, Argon, Thermal properties, Stability, Tantalum, Cladding, Performance (Engineering), Microstructure, Thermoelectricity.

In an effort to extend the useful thermocouple range to 2500 C and beyond, investigations have been conducted in the use of refractory metal wires as thermocouple legs. To determine the feasibility of employing tungsten and tungsten-rhenium alloys in selected environments, both exposed bead and preformed tantalum-sheathed thermocouples were studied. A series of thermal stability tests have been conducted at temperatures up to 1400 C, as well as a very high temperature test at 2400 C. Both W/W 26% Re and W 5% Re/W 26% Re thermocouples were tested in a reduced pressure carbon-argon atmosphere. A comparison was made of the electromotive force obtained and that predicted by the standard published data. Analysis of the findings indicates that thermal cycling can effect a 2.5% increase in emf output; furthermore, the use of thoria insulators limits the maximum useful temperature of the thermocouples to 2300 C. The effectiveness of the tantalum sheath is discussed, as well as the comparative capabilities of the preformed and exposed bead thermocouples of both the W/W 26% Re and W 5% Re/W 26% Re types. (Author)

AD-606 310 Div. 17
OTS Prices: HC $2.00/MF $0.50

Southern Research Inst., Birmingham, Ala.
MECHANICAL AND PHYSICAL PROPERTIES OF TZM MOLYBDENUM ALLOY SHEET OF TUNGSTEN SHEET.
Quarterly progress rept. no. 7, 1 May-31 Aug 64,
by Clifford L. Dotson and P. G. Adams. 30 Sep 64,
46p SRIB-6985-1479-VII
Contract N600 19 59530

Unclassified report

Descriptors: (*Molybdenum alloys, Mechanical properties), Sheets, Titanium alloys, Zirconium alloys, Carbon alloys, Tensile properties, Physical properties, Recrystallization, Brittleness, Ductility, Transition temperature, Thickness.

Tensile tests were conducted on recrystallized 0.060 in. and 0.100 in. tungsten sheet from room temperature up up to 3500F. Notched- and unnotched-tensile tests were conducted on the 0.060 in. tungsten sheet in the optimum and recrystallized conditions at moderately elevated temperatures (900F and below) to determine the notched-tensile, brittle-ductile transition temperature. Tensile tests were conducted on recrystallized 0.060 in. and 0.100 in. tungsten sheet from room temperature up to 3500 F. Notched- and unnotched- tensile tests were conducted on the 0.060 in. tungsten sheet in the optimum and recrystallized conditions at moderately elevated temperatures (900 F and below) to determine the notched-tensile, brittle-ductile transition temperature. Tensile tests were completed on the 0.020 in., 0.040 in. and 0.060 in. TZM temperatures for these tests ranged from room temperature to 3000F.

AD-606 314 Div. 17, 14
OTS Prices: HC $3.00/MF $0.50

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Sep 64, 51p
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Metals, Bibliographies), (*Bibliographies, Metals), Indexes, Metallography, Alloys, Alkaline earth metals, Aluminum, Transition elements, Refractory metals, Non-metals, Coatings, Composite materials, Metallurgy, Steels, Cobalt alloys, Nickel alloys, Stainless steel, Beryllium, Titanium, Magnesium, Graphite, Carbon, Refractory materials, Ceramic materials, Chromium, Vanadium, Platinum.

The 'DMIC Selected Accessions' is a current listing of selected documents and journal articles in an abstracted form on subjects within the technical scope of the Defense Metals Information Center (DMIC). It does not include restricted documents received by DMIC, such as Government classified reports, many of the progress reports issued to Government agencies, or company proprietary reports. It is published to supply current information and to provide an awareness of technical-information sources to Government contractors and subcontractors. Topics include: High-strength alloys, light metals, nonmetallics, refractory metals, Coatings, applications, and Composites.

AD-606 486 Div. 17
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF HIGH-STRENGTH STAINLESS STEELS.
Rept. for 1 Jan-31 Mar 61,
by D. A. Roberts. 14 Apr 61, 6p DMIC-M-99
Contract AF33 616 7747
PB 161 249

Unclassified report

Descriptors: (*Stainless steel, Metallurgy), Steel, Alloys, Manganese alloys, Aluminum alloys, Nickel alloys, Vanadium alloys, Carbon alloys, Chromium alloys, Molybdenum alloys, Tungsten alloys, Loading (Mechanics), Rupture, Stresses, Tensile properties, Fatigue (Mechanics), Ductility.

Research and development in the field of high-strength stainless steels appears to be directed along two principal paths: (1) the development of alloys with improved strength properties and (2) the accumulation of information on the properties and physical metallurgy of existing alloys so that they may be used more effectively. By and large, the development of new alloys is being carried out by the stainless-steel producers, while the accumulation of property data for the most part is being undertaken on Government contracts. (Author)

AD-606 487 Div. 17
OTS Prices: HC $1.00/MF $0.50

Alloyd Research Corp., Watertown, Mass.
RESEARCH ON THE PROBLEM OF DUCTILITY IN BERYLLIUM,
Progress rept. no. 2,
by Joseph S. Lukesh. Jan 58, 18p
Contract AF33 616 5300

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beryllium, Refining (Metallurgy), (*Refining (Metallurgy), Beryllium), Ductility, Purification, Reduction (Chemistry), Halides, Furnaces, Induction heating, Zone melting, Evaporation, Vacuum apparatus, Electron beams, Corrosion, Silver, Chlorine, Chemical reactions, Silver compounds, Chlorides, Valves, Sodium, Distillation.

The rate of corrosion of silver by dry chlorine at 600C and one atmosphere pressure was determined to be about one-thousandth of an inch in one hundred hours, a figure sufficiently low to make the use of silver apparatus in the halide reduction process entirely feasible. Several models of silver chloride valves were constructed and tested. Difficulties in operation rendered this type valve impractical, and it was decided to control the flow of reactant vapors by adjusting helium pressure. An experiment has been designed and equipment assembled to study the chlorination reaction of beryllium with respect to required flow rates of gases and the nature of the condensate. An induction furnace has been designed and constructed for the zone-refining of commercial grade beryllium, and construction of the electron-beam equipment for ultra-high vacuum zone-refining initiated. (Author)

AD-606 494 Div. 17
OTS Prices: HC $2.00/MF $0.50

High Temperature Materials Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATION OF THE STRENGTHENING MECHANISMS OF DISPERSION STRENGTHENED ALLOYS,
Rept. for 1 Feb 63-29 Feb 64,
by Richard J. Murphy and Nicholas J. Grant. Jul 64,
47p

similar to those obtained for tungsten and tantalum in earlier studies. A high-voltage D C pulsing unit has enabled uninterrupted elevated temperature observation of the reaction of oxygen with molybdenum. The temperature range studied is 300 - 1000K. Although the utilization of this technique is in the preliminary stages, it is certain to enhance the versatility of field emission microscopy in the study of gas-metal reactions. This technique will be utilized in this laboratory as a major approach in the study of initial stages of oxidation of metals at temperatures less than 1000K. The effect of nonoxidizing gases, present as impurities in the oxidizing atmosphere, in altering the reaction kinetics has been studied further. In order to determine the extent of the effect fully, a mass spectrometer will be used to determine the concentration of gases present in the oxidizing chamber.

AD-606 806 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
DISPERSION STRENGTHENED COPPER-THORIUM BORIDE AND COPPER-ALUMINA ALLOYS PRODUCED BY MELTING AND CASTING.
Technical information series,
by Gilbert J. London. 6 Aug 59, 38p R59SD407
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Copper alloys, Dispersion hardening), (*Dispersion hardening, Copper alloys), Thorium compounds, Borides, Aluminum compounds, Oxides, Melting, Casting, Tensile properties, Creep, Stresses, Rupture, Loading (Mechanics), Resistance (Electrical), Microstructure, Diffusion.

This report describes work on producing dispersion strengthened copper alloys using melting and casting techniques as opposed to more conventionally used powder metallurgy techniques. Two methods of approach are described. One method produces copper-thorium boride alloys by liquid phase precipitation. Cu-2% ThB4 alloys produced by this technique show 10 to 80% improved tensile properties, two-to-three orders of magnitude improved creep and stress-rupture properties together with a 2 to 10% increase in electrical resistivity. The second method produces a copper-aluminum oxide alloy by a solid state diffusion reaction following melting and casting. The precipitate formed is extremely fine, resisting recrystallization at 1000C for 24 hours. (Author)

AD-606 824 Div. 17, 14, 26
OTS Prices: HC $3.00/MF $0.75

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
15 Sep 59, 95p
Unclassified report

Descriptors: (*Metals, Bibliographies), (*Alloys, Bibliographies), Indexes, Abstracting, Titanium alloys, Beryllium, Refractory metals, Steel, Stainless steel, Nickel alloys, Cobalt alloys, Iron alloys, Yttrium, Rare earths compounds, Material forming, Mechanical properties, Refractory materials, Laminates, Composite materials, Ablation, Boundary layer.

An annotated bibliography is given on light metals, refractory metals, high-strength alloys, rare earth metals, nonmetallic refractories, and composites.

AD-606 827 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
STRUCTURE IN TEXTURED GOLD FILMS.
Final rept.,
by J. E. Davey and R. H. Deiter. 4 Sep 64, 20p
Proj. RR008 03 46 5658
NRL 6121
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metal films, Gold), (*Gold, Crystal structure), Films, Metallic crystals, Crystal lattices, X-ray diffraction analysis, Electron diffraction analysis.

Gold films deposited by evaporation onto amorphous substrates at a wide variety of temperatures were examined by x-ray and electron-reflection diffraction, as well as by resistivity measurements. It was found that: (a) the (111) texture predominates at all deposition temperatures and appears almost exclusively between 370 and 500C; (b) the hexagonal partial structure, first noted by others in cold-worked bulk gold, appears in electron diffraction in this temperature range, along with the forbidden (110) reflection; (c) the deposition process introduces large concentrations of vacancies, which cluster under annealing into quite stable complexes. A large observed increase in resistivity and a contraction of the lattice as measured by x-ray diffraction are related to these vacancies. (Author)

AD-606 567 Div. 17
OTS Prices: HC $1.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
EFFECT OF AGING TEMPERATURE AND TIME ON THE MECHANICAL PROPERTIES OF TITANIUM ALLOY 6Al-6V-2Sn,
by Armando A. Iannelli and Ellsworth H. Swift. Jul 64, 24p
Proj. 51215030
AMRA TR64 17

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Titanium alloys, Mechanical properties), (*Aging (Materials), Titanium alloys), Time, Aluminum alloys, Vanadium alloys, Silicon alloys, Temperature, Tensile properties, Deformation, Impact (Mechanics), Stresses, Tests, Microstructure.

A series of tests were conducted to determine the effect of aging temperature and time on the mechanical properties of titanium alloy 6Al-6V-2Sn. The aging temperature were varied from 900 F to 1100 F and the aging time at each temperature varied from 4 to 32 hours. The solution temperatures and time were held constant. The results show that in general, as aging temperature and/or aging time increases, yield and tensile strengths decrease, while elongation, reduction of area, and Charpy V-notch impact strength increase. (Author)

AD-606 666 Div. 17
OTS Prices: HC $4.00/MF $0.75

Nuclear Metals, Inc., Concord, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for 17 Jun 59-1 Oct 63,
ed. by A. R. Kaufmann. Jul 64, 112p
Contract AF33 616 7065, Proj. 7351, Task 735104
ASD TDR62 509 V3

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beryllium, Powder metallurgy), (*Powder metallurgy, Beryllium), Purification, Distillation, Vacuum apparatus, Impurities, Ductility, Mechanical properties, Single crystals, Powder metals, Particle size, Material forming, Chemical analysis, Microstructure, Spectrography, Metallography.

The projects reported in this volume are primarily concerned with effects of grain size and purity of beryllium. Section II describes the efforts to produce the purest beryllium possible by double vacuum distillation. The distilled beryllium when converted to powder and subsequently extruded exhibited greater bend ductility than any of the other forms of less pure beryllium utilized in the evaluation. In Section III, the work involves the evaluation of the ductility and critical resolved shear stress for basal slip of cast single crystals of Pechiney SR grade and single distilled beryllium. The data were compared with previous work on cast commercial grade and zone-refined single crystals. Sections IV and V were aimed at achieving finer grain size powder, while minimizing contamination, than had ever been produced. In Section IV, the powder of particle sizes less than 5 microns was produced by improved attritioning methods. Section V reports the attainment of powder sizes of approximately 300 angstroms by evaporation and condensation. Section VI was concerned with the consolidation and evaluation of powders produced in Section V. The hot pressed powder had exceptionally high hardness and was very brittle, prohibiting the preparation of mechanical test specimens. (Author)

AD-606 667 Div. 17, 25
OTS Prices: HC $3.00/MF $0.75

Nuclear Metals, Inc., Concord, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM. A STUDY OF THE BRITTLE BEHAVIOR OF BERYLLIUM BY MEANS OF TRANSMISSION ELECTRON MICROSCOPY.
Rept. for 1 Jul 60-31 Mar 63,
by F. Wilhelm and H. G. F. Wilsdorf. Jul 64, 69p
Contract AF33 616 7065, Proj. 7351, Task 735104
ASD TDR62 509 V4

Unclassified report

Subcontracted to Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beryllium, Brittleness), (*Crystal lattice defects, Beryllium), Electron microscopy, Single crystals, Impurites, Crystals, Failure (Mechanics).

Glide dislocations in beryllium specimens were studied by direct observation with an electron microscope. Glide dislocations in beryllium are strongly hindered in their movements and are often pinned by lattice imperfections and larger precipitate particles, especially in beryllium of commercial purity. Dislocation tangles have been observed in deformed Pechiney flake beryllium and in crystals of commercial purity; the presence of round as well as elongated prismatic dislocation loops is in evidence. Dislocations of different slip systems may react to form incipient networks. In specimens where dislocation pinning is less pronounced, dislocations have a tendency to align themselves along crystallographic directions. In high purity tensile specimens, dislocation bundles of high density are found to lie in the basal plane in a (1100) direction perpendicular to the principal glide direction. Many of these dislocations are dipoles. It is found that most dislocation reactions are confined to relatively thin glide packets parallel to the basal plane. Rarely have dislocation motions been observed under the stress created by a high-intensity electron beam in the microscope. A high Peierls-Nabarro force as well as high stacking fault energy in beryllium is concluded. An inference is drawn with regard to the brittleness problem of beryllium. (Author)

AD-606 776 Div. 17, 30
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ., Columbus. Research Foundation.
4397-C INITIAL STAGES OF OXIDATION OF METALS.
Final rept. for 1 Jul 63-31 Jul 64,
by K. L. Moazed. 8 Sep 64, 2p
Grant DA ARO D31 124G470, Projs. 20010501B700, 1666
AROD 4397 2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Molybdenum, Oxidation), (*Oxidation, Molybdenum), Metals, Reaction kinetics, Impurities, Field emission, Microscopy, Mass spectroscopy, Test methods, High temperature research.

The results of study of the initial stages of oxidation of molybdenum at temperatures less than 1000K are quite

Physical properties, Tests, Tables, Models (Simulations), Design, Systems engineering.

The report describes the development of a System Analysis Model (SAM) utilizing equipment characteristics and maintenance environments of Air Force equipments, which provides a guide for technical writers in the selection of the most efficient fault isolation presentations for current and R and D systems. From this model, three characteristics which affect the efficiency of fault isolation presentation formats were selected for experimental manipulation and evaluation. These characteristics: (1) type of circuitry, (2) type of indicators, and (3) system complexity were used to evaluate the relative efficiency, in terms of performance accuracy and time, of three fault isolation presentation formats: (1) standard schematics, (2) data flow diagrams, and (3) proceduralized instructions. Their nonsignificant differences suggest that the criterion for choosing between standard schematics and data flow diagrams would be the cost of development when dealing with equipments with similar characteristics. Significantly, proceduralized instructions were found to be more efficient than the other two formats. (Author)

AD-606 265 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GENERALIZED ANALYSIS OF AERIAL CAMPAIGNS AGAINST STRATEGIC TARGETS,
by R. Schamberg. 9 May 57, 39p P-1017
Unclassified report

Presented at the Annual Meeting of the Operations Research Society of America (5th), 9-10 May 57. Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Symposia, Strategic bombing), (*Strategic bombing, Aerial warfare), (*Aerial warfare, Strategic bombing), Strategic warfare, Targets, Costs, Aircraft, Weapons, Defense systems, Equations, Aviation personnel.

An analytic technique is described for direct determination of the outcome of optimal aerial bombing or reconnaissance campaigns against strategic targets, without the customary laborious exploration of variations in attack strategy. The scope of this analysis permits wide latitude in the nature of the strategic campaign and its environment, including the following: the criterion defining an optimum campaign may be that of minimum cost, or minimum air crew loss for a fixed level of target destruction, with or without additional constraints such as specified maximum campaign duration; aircraft losses may be due to enemy area and local defenses, non-combat causes, or due to destruction while on their own base. Several examples are used to illustrate how the analytic method presented here leads to a better understanding of the significant features of strategic campaigns, and their sensitivity to variations in assumptions, than can be gleaned from an essentially empirical study of many individual campaigns. (Author)

AD-606 270 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
KLAUS KNORR ON WAR POTENTIAL: A BRIEF REVIEW,
by Malcolm W. Hoag. 18 Nov 57, 4p P-1025
Unclassified report

Descriptors: (*Mobilization, Reviews), (*Reviews, Mobilization), (*Economics, Warfare), Mobilization, Deterrence, Nuclear warfare, Cold war, Political science, Sociology.

Professor Knorr finds contemporary relevance in the notion of mobilizable war potential, and devotes ninety-odd per cent of his pages to the case, typified by World War II, in which a nation has an opportunity to mobilize its strength fully after hostilities have begun. He deals lucidly and sensibly with this contingency, and can justly claim achievement of his objective: (1) a synthesis of the extensive post-World War II literature on economic mobilization which (2) incorporates political and sociological insights bearing upon the will and the ability to organize for fighting.

AD-606 273 Div. 18, 28
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SYSTEMS RESEARCH LABORATORY'S AIR DEFENSE EXPERIMENTS,
by W. C. Biel, R. L. Chapman, J. L. Kennedy, and A. Newell. 23 Oct 57, 51p P-1202
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Systems engineering, Air defense command), (*Symposia, Human engineering), (*Air defense command, Operations research), Performance (Human), Learning, Behavior, Simulation, Air force personnel, Defense systems, Warning systems, Leadership, Motivation, Tracking, Adjustment (Psychology).

The desired performance of complex systems can be realized only through designing and managing them for operational flexibility. This can be done by harnessing the learning ability of men in organizations. Conditions for encouraging men to adapt system's resources to most efficient use follow from the organism analogy--a key notion for explaining the behavior of the four crews studied. In addition, the simulation techniques developed in the course of the research provide a means for continued 'head-on' attacks on a crucial problem of the present day--that of better understanding of the adaptation process in organizations, so that it can be used and controlled. The paper is in the form of a report of a scientific search. The story of experimental mistakes, modifications in method, and successive insights is presented to convey the essence of an ambitious investigation at the frontier of knowledge where the terrain is not well-mapped and the research tools are being developed as needed. (Author)

AD-606 299 Div. 18, 1, 22, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RELATIONSHIPS BETWEEN WEAPONS AND LOGISTICS EXPENDITURES,
by Murray A. Geisler. 28 Aug 56, 29p P-1036
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Weapons, Budgets), (*Logistics, Budgets), Aircraft, Maintenance, Management engineering, Inventory control, Economics, Air force budgets.

The paper discusses the trade-offs which are always made -- implicitly or explicitly -- between investing in a weapon and in its logistics support. The importance of some well-known general relationships are considered: (1) A weapons system, its supply support, and its maintenance support are all one package and for many management purposes should be considered together.

18. Military Sciences and Operations

AD-606 156 Div. 18, 26, 30
OTS Prices: HC $3.00/MF $0.75

Air Force Systems Command, Washington, D. C.
PERT PROGRAM MANAGEMENT AND DEVELOPMENT PLAN,
Apr 62, 100p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air force systems command, Research program administration), (*Management engineering, Air force systems command), Weapon systems, Costs, Department of Defense, Management planning, Personnel, Training, Air defense command, Data processing systems.

PERT (Program Evaluation and Review Technique) is a management technique that utilizes the concept of time-based network program planning. AFSC recognized the value of PERT for application on critical or complex weapons systems and projects and, in the past two years has become its largest user. Now, the basic techniques are to be extended to include cost and other selected management parameters. However, since PERT is not an end in itself in spite of publicity accorded it, this system must be seen in perspective as only one of numerous techniques used in management of AFSC programs. This plan considers this throughout the management and development activities which are described in it.

AD-606 169 Div. 18, 15, 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE DISTRIBUTION OF THE TIME-DURATION OF STOCHASTIC DUELS,
Scientific rept.,
by C. J. Ancker, Jr. and A. V. Gafarian. 10 Aug 64,
32p SP-1017/007/00

Unclassified report

Descriptors: (*Stochastic processes, Game theory), (*Sampling, Operations research), (*Warfare, Game theory), (*Game theory, Warfare), Military tactics, Logistics, Mathematical models, Decision making, Statistical analysis.

The Theory of Stochastic Duels is extended by considering the distribution of time-to-completion of the fundamental duel. The model has fixed kill probabilities and either random or fixed time between rounds fired. Time-limitation is included. Special cases and examples are worked out. Clearly, the time-duration of combat has both tactical and logistic implications for the decision-maker. (Author)

AD-606 202 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WORLD-WIDE HISTORIC VICTORY OF THE SOVIET PEOPLE,
29 Jan 59, 36p T-110
TT 59-10556

Unclassified report

Trans. from Voennaya Mysl' (USSR) 1955, no. 5.

Descriptors: (*Warfare, Public opinion), Military strategy, Military tactics, USSR, Political science, Foreign policy, Threat evaluation.

From a political viewpoint, this editorial is an exposition of the current Soviet view on the causes and results of World War Two. From a military viewpoint the editorial contains a number of interesting points for a Western reader: (1) Some indications of the weakness in Soviet military thinking and planning in the pre-World War Two Period; (2) An enumeration of problems in the area of strategy and tactics to which Soviet planners are called upon to devote their attention if they are to be prepared for future emergencies; (3) A discussion of factors, operative in the current international framework and now in evidence, which constitute long-range warning signs of possible war in the future. (Translator)

AD-606 205 Div. 18
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME SOVIET VIEWS ON THE NATURE OF A FUTURE WAR AND THE FACTORS DETERMINING ITS COURSE AND OUTCOME: SOVIET MILITARY SCIENCE ON THE CHARACTER OF CONTEMPORARY WAR; ON THE BASIC FACTORS DETERMINING THE COURSE AND OUTCOME OF WAR AND COMMENTS,
by I. S. Baz' and I. Korotkov. 15 Sep 58, 54p T-97
TT 64 71445

Unclassified report

Trans. from Voennyi Vestnik (USSR) 1958, v. 38, no. 6, p. 19-29; Sovetakaya Aviatsiya (USSR) 1958, 12 Aug.

Descriptors: (*Warfare, Military strategy), (*Military strategy, USSR), Armed forces (Foreign), Strategic warfare, Nuclear weapons, Defense systems, Aerial warfare, Communism, Economics, Political science, Social sciences, Military tactics, Military publications.

Two articles from the Soviet military press which treat some major problems of Soviet military thought in unusually comprehensive and systematic fashion are presented. The first, entitled 'Soviet Military Science on the Character of Contemporary War,' by Colonel I. S. Baz', was published in the June 1958 (No. 6) issue of Military Herald, the Defense Ministry monthly which deals chiefly with problems of ground force officers. The second, entitled 'On the Basic Factors Determining the Course and Outcome of War,' by Colonel I. Korotkov, was published in the Air Force daily, Soviet Aviation, on August 12, 1958. The Military Herald article draws together and provides a theoretical framework for views on the character of a future war expressed piecemeal by other Soviet authors in the past. The conceptual framework of the discussion is embodied in the context of an attack on the historical indeterminism of Clausewitz's theory of wars.

AD-606 215 Div. 18, 26
OTS Prices: HC $2.25/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SPECIFICATION OF OPTIMUM FAULT ISOLATION PRESENTATION,
Final rept. for Mar 63-Mar 64,
by W. R. Atchley, J. Ver Hulst, and D. J. Lehr.
Jun 64, 112p
Contract AF33 657 10834, Proj. 7184, Task 718406
AMRL TDR64 57

Unclassified report

Descriptors: (*Air force equipment, Maintenance), Malfunctions, Instruction manuals, Specifications,

Prpared for presentation at the joint AIIE-ORSA-TIMS Symposium on System Simulation, Hotel Statler, New York City, 16-17 May 57. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Systems engineering), (*Air defense command, Operations research), (*Systems engineering, Air defense command), Simulation, Human engineering, Defense systems, Performance (Human), Air force training, Learning.

This research attempted to obtain the predictable features of a closed system by exploiting man's capacity to seek and find problem solutions. That is, if man could be motivated to seek the system's goal, and if he were provided knowledge of operational results, a disparity between actual and desired performance might serve as an error feedback to trigger adaptation of operating practices to improve effectiveness. To explore this possibility, a particular man-machine system, a part of the air-defense network, was simulated in the laboratory. Included in the laboratory system were not only functional representations of the machine components but also the men themselves--under such conditions as to permit them the latitude of action found in the real world. Such a system was exposed to successively more difficult task situations, the results of performance were reported back to the crew, and the questions asked were: Could men learn to improve system performance; 'what' did they learn; and 'why' did they learn.

AD-606 373 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION IN RAND'S LOGISTICS SYSTEMS LABORATORY,
by William W. Haythorn. 30 Apr 57, 14p P-1075
Unclassified report

Prepared for presentation at the joint AIIE-ORSA-TIMS Symposium on System Simulation, Hotel Statler, New York City, 16-17 May 1957. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Simulation), (*Air force operations, Logistics), Inventory control, Data processing systems, Management engineering, Air Force research.

The techniques of simulation being developed for the Logistics Laboratory are applicable to many kinds of supply and distribution systems. With modifications, it should be possible to extend the techniques to many industrial and business enterprises where service-testing of new management policies and procedures is desirable but difficult to implement because of organizational interactions or the danger of disrupting ongoing activities. The kinds of problems that seem especially relevant are those involving inventory control, inventory size, centralized versus decentralized procurement, centralized versus decentralized stocking, etc.

AD-606 386 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE WORTH OF PRINCIPLES OF WAR,
by B. Brodie. 21 May 57, 23p P-1092
Unclassified report

The following lecture was delivered on 7 Mar 57, at the U. S. Army Command and General Staff College, Fort Leavenworth, Kans.

Descriptors: (*Warfare, Theory), (*Military strategy, Theory), Military tactics, Armed forces operations, Naval operations, History, Decision making, Officer personnel.

The principles of war are discussed in terms of historical and present day military strategy.

AD-606 435 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GERMAN DISCUSSION OF ATOMIC WEAPONS AND THE LAW,
by Ewald W. Schnitzer. 17 Jul 57, 10p P-1106
Unclassified report

Descriptors: (*Nuclear weapons, Law), (*Law, Nuclear weapons), (*West Germany, Nuclear weapons), Armament, Political science, Leadership, Social sciences, Government (Foreign).

The subject of atomic armament for the Bundeswehr, the newly established armed forces of West Germany is discussed. For the first time the question of the relationship between atomic weapons and the law has been discussed in the German press. On May 18, 1957, a letter to the editor was published in Frankfurter Allgemeine Zeitung uder the heading 'Atomic Weapons and the Law'. The letter is reproduced in translation. Although it furnishes only scant material on the subject, it does present a first definition of the problem, and deals with an issue which may have far-reaching political implications.

AD-606 437 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME STRATEGIC IMPLICATIONS OF THE NUCLEAR REVOLUTION,
by Bernard Brodie. 14 May 57, 22p P-1111
Unclassified report

Presented before the Institute of World Affairs, University of Utah, 14 May 57.

Descriptors: (*Nuclear weapons, Limited war), (*Limited war, Nuclear weapons), History, Strategic bombing, Nuclear bombs, Urban areas, Population, Defense systems, Strategic air command, Deterrence, Cold war, Nuclear warfare.

The discussion is concerned with the problems involved in the use of nuclear weapons in limited warfare. The conclusion states: ...'In order to make work at all anything as arbitrary and forced as limitations upon war are likely to be, it would seem that one major requirement is that transgressions or violations be very easy to recognize and very difficult to deny. This is not to say that we may not use nuclear weapons in limited war; it only underlines the problem of finding out how we can use them without thereby signaling the abandonment of restraints.'

AD-606 443 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IMPLICATIONS OF NUCLEAR WEAPONS IN TOTAL WAR,

(2) The number of operationally-ready aircraft sometimes may possibly be increased more economically by devoting additional resources to supply or maintenance support rather than by buying additional units of the end item. (3) Similarly, shifting resources between supply and maintenance could be a means of increasing the operationally ready inventory. (4) In managing a weapon, Standards should not be set for one logistics activity without regard to the others. For example, with a fixed budget, an effort to reduce the AOCP rate too far may so impinge on maintenance resources as to reduce the number of operationally ready weapons. The opposite is also possible. (Author)

AD-606 320 Div. 18
OTS Prices: HC $4.00/MF $1.00

International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 35, 21 Apr-20 May 64.
20 Jun 64, 132p IEC-20130
Contract AF19 626 8
ESD TDR64 447

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Strategic air command, Control systems), (*Control systems, Strategic air command), Test methods, Simulators, Training, Air force personnel, Air force systems command, Air defense command, Data transmission systems, Data processing systems, Programming (Computers), Management engineering, Defense systems, Display systems, Systems engineering, Communications systems.

Information is presented concerning each Milestone established in the 465L System Test Plan. The Milestone information is organized generically by Centrals and other descriptive titles for activities of similar scope. These, in turn, are consolidated according to subsystem and comparable collective designations. Testing not attributable to the 465L System Test Plan Milestones are reported in paragraphs associated with their related test activities. The System Test Facility (STF) located at the Contractor's Project Headquarters supported demonstrations, special tests and training. Specific activities reported for the STF included continuation of RFI testing to determine the effectiveness of Circuit Card Suppressors and Signal/Power Line Filters, updating the three production RCC's in compliance with the approved Baseline Configuration, and the conduct of validation tests on the D-35 Drawer Tester.

AD-606 360 Div. 18, 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DESIGN CHANGE IMPACTS ON AIRFRAME PARTS INVENTORIES,
by James W. Petersen and Wilbur Steger. 31 Oct 57, 35p P-1055, rev.

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inventory control, Obsolescence theory), (*Obsolescence theory, Inventory control), (*Airframes, Inventory control), Air force procurement, Economics, Logistics, Management engineering, Spare parts.

This study is an attempt to provide part of the information needed to assess the costs of holding a spares inventory, namely, the cost of airframe inventory which becomes obsolete as a result of design changes. Such information, for example, would be extremely useful in determining a suitable spares procurement policy for a new military weapon.

AD-606 369 Div. 18, 33
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PROPOSAL FOR REDUCING THE COST OF LOGISTICS SUPPORT,
by James W. Petersen and Wilber Steger. 23 Apr 57, 8p P-1068

Unclassified report

Descriptors: (*Logistics, Costs), (*Costs, Logistics), (*Spare parts, Air force procurement), Transportation, Storage, Degradation, Inventory control, Management engineering.

Deferral of procurement is distinctly worthwhile for some items. These are, for the most part, expensive spare parts which are few enough to be managed with considerable attention, and also of such a nature that spares consumption is almost certainly sure to be low during the phasing-in of new equipment. The savings indicated may be as high as sixty per cent of the total cost of expensive items under the present supply system, and undoubtedly exceeds thirty per cent of this cost. Since expensive spares consititute more than fifty per cent of the total dollar value of the supply system, the indicated savings are very substantial. The deferred procurement system does not result in a noticeable reduction of the effectiveness of the supply system if deferral is practiced just long enough to collect sufficient data to make a substantially improved forecast of future consumption. In the current study, this period was approximately eighteen months in length.

AD-606 371 Div. 18, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE COMPUTATIONAL SOLUTION OF DYNAMIC-PROGRAMMING PROCESSES. I. ON A TACTICAL AIR-WARFARE MODEL ON MENGEL,
by Richard Bellman and Stuart Dreyfus. Rev. 23 May 57, 24p P-1072

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerial warfare, Mathematical models), (*Dynamic programming, Aerial warfare), Military tactics, Game theory, Air force operations, Statistical analysis, Functions.

The paper is devoted to the computational solution of dynamic programming processes. The functional-equation approach is used to treat a tactical air-warfare model that A. Mengel previously considered by means of classical variational techniques. (Author)

AD-606 372 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION IN RAND'S SYSTEM RESEARCH LABORATORY,
by Robert L. Chapman. 30 Apr 57, 12p P-1074

Unclassified report

Descriptors: (*Costs, Weapons systems), (*Weapon systems, Information retrieval), (*Information retrieval, Weapon systems), Subject indexing, Abstracting, Documentation, Periodicals, Military publications, Defense systems, Personnel, Statistical data, Automation, Air force systems command.

RAND's Cost Analysis Department has developed a Data Bank to satisfy its need for a comprehensive depository of cost and resource information covering most weapon and support systems in the military establishment. The intention was to provide a single center for material previously available only in individual analysts' files, to augment this with general purpose information, and thus create a central data repository for all analysts to use. It attempts to be a collective memory for the whole of the Cost Analysis Department, organized in an informal fashion as an analyst would maintain his own file. (Author)

AD-606 585 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMICS OF A DUAL CAPABILITY,
by Malcolm W. Hoag. 4 Nov 57, 12p P-1195
Unclassified report

Descriptors: (*Warfare, Economics), (*Economics, Warfare), Costs, Limited war, Nuclear warfare, Defense systems, Aerial warfare, Nuclear weapons, Air defense command, Strategic bombing, Strategic warfare.

A 'dual capability' can be defined as a military capability for fighting all-out wars or limited wars. Whether we can and should support a dual capability, however, becomes a real economic issue only if we desire different kinds of forces to fight these different kinds of war. If, in accord with the definition given for this seminar, we limit war by constraining only its objectives, area of combat, and resource commitment, the same strategic airpower that is our main deterrent to all-out war can be militarily effective in fighting limited wars. A small strategic bomber force could be diverted quickly to fight in a war so limited, and its attrition at the hands of the enemy would probably be negligible if used in areas not covered by the Soviet air defense network. It need not remain vulnerably based in exposed forward areas, and, most important, its use need not detract from our general deterrent power. The decision to use such a force would itself be the signal to bring the remainder of our strategic force to a higher state of alert, so raising our retaliatory capability.

AD-606 610 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON NATO POOLING,
by Malcolm W. Hoag. 30 Dec 57, 14p P-1242-RC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Political science, Defense systems), (*Defense systems, Reviews), (*Reviews, Defense systems), Armed forces (Foreign), Military budgets, Government (Foreign), United States government, Defense systems, Weapon systems, Costs, Guided missiles, Military strategy, Deterrence, Military organizations.

The books under review urge greater pooling of effort in NATO, especially of the Military research and development efforts that are most likely to be affected by Sputnik. This review concentrates upon this theme and, more briefly, upon burden sharing.

AD-606 690 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET CIVIL DEFENSE PROGRAM,
by Leon Goure. Mar 62, 24p P-2554
Unclassified report

This lecture was prepared for presentation at the National Meeting of the American Chemical Society, Division of Industrial and Engineering Chemistry in Washington, D. C. 27 Mar 62.

Descriptors: (*Civil defense systems, USSR), (*USSR, Civil defense systems), Government (Foreign), Shelters, Population, Training, Propaganda, Symposia.

Soviet civil defense is the subject of public discussion in the United States with a great deal of conflicting information being published about it. Following the late President Kennedy's announcement of plans to accelerate and expand the United States civil defense and shelter construction program, the Soviet Union has done its best to cast doubts on the value of the U. S. effort as well as to deny the existence of a similar civil defense program in the Soviet Union.

AD-606 847 Div. 18, 20, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CRISIS IN MILITARY AFFAIRS,
William W. Kaufmann. Rev. 28 Feb 58, 48p
P-1295
Unclassified report

This paper is a somewhat extended review of Nuclear Weapons and Foreign Policy, by Henry A. Kissinger. It was scheduled to appear in World Politics, Jul 58. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, Nuclear weapons), (*Nuclear weapons, Foreign policy), Political science, Military strategy, United States government, Disarmament, Defense systems, Armed forces budgets, Weapon systems, Strategic air command, Strategic warfare, Nuclear warefare, Limited war, Economics, Reviews.

In the years since World War II, American statesmen have found themselves increasingly preoccupied with military problems in their efforts to maintain and advance the interests of the United States. Not only have they had to decide how to deal with the various military threats to these interests. They have also had to take strategic considerations and the risk of war into account in all their day-to-day dealings with the outside world. Their task would have proved difficult enough had they had to confront the hostility of the Soviet empire with the traditional means of warfare. It has become almost unimaginably complex as a result of growing Russian power and what appears to be a continuing revolution in the technology of military weaponry. As a somewhat extended review of Nuclear Weapons and Foreign Policy, by Henry A. Kissinger, this

by Bernard Brodie. 8 Jul 57, P-1118
Unclassified report

Prepared for publication in the Royal Canadian Air Force Staff College Journal, 1957.

Descriptors: (*Strategic bombing, Nuclear warfare), (*Nuclear warfare, Strategic bombing), (*Nuclear weapons, Nuclear warfare), (*Warfare, Nuclear warfare), History, Nuclear bombs, Urban areas, Population, Survival, Shelters, Nuclear warfare casualties, Nuclear explosions, Defense systems, Air defense command, Strategic air command.

The discussion on total nuclear warfare concludes: '. . . Barring revolutionary and presently unforeseen advances in air defense, an unrestricted strategic air campaign in a war in which the United States is engaged is bound to be decisive. It does not matter greatly whether the number of nuclear weapons-on-target required to guarantee decisiveness is a few score or a few hundred, because we are in realms of figures that are well within the capabilities at least of the United States (the critical factor being, of course, delivery capability rather than size of the nuclear stockpile). And it is equally certain that these figures are now or soon will be within the capabilities of one or more other powers. Figures for a strategic-bombing campaign running into the thousands of bombs-on-target are likely to be either morbidly fanciful or pointed toward a campaign aimed not merely at a simple military decision but at complete national obliteration.'

AD-606 453 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTERNATIONAL REGISTRATION OF THE ATOM,
by Arnold Kramish. 26 Jul 57, 10p P-1134
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Disarmament, Nuclear weapons), (*Nuclear weapons, Disarmament), (*United Nations, Disarmament), Radiation hazards, Radioactive fallout, Nuclear explosions, Political science, United States, Great Britain, USSR.

The discussion is centered around the following question: In view of the Universal Declaration of Human Rights which proclaims the individual's 'right to life, liberty and security of person,' is it not within the province of the United Nations to enunciate the following principle. 'That nations and individuals engaged in nuclear research and development operations of any sort have an obligation to do so at minimum risk to other nations and to the individuals of all nations. Further, it is the common right to know of any such operations which possess a potential of harm or could conceivably magnify themselves to a stage dangerous to individual life and security.' On the whole, the last decade has shown a discouraging lack of progress in disarmament negotiations. This is due, in large measure, to the comprehensive, sweeping nature of the plans submitted. And if we are now beginning to make any progress in this field, it is because emphasis has been changed to the achievement of step-by-step goals. But the final goal, disarmament in its absolute sense, may never be achieved--the common goal must be the disciplined manufacture and use of armaments.

AD-606 455 Div. 18, 1
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
INTERCONTINENTAL MILITARY AIR TRANSPORT: AN APPLICATION OF A MODEL FOR THE STUDY OF AIRCRAFT PROCUREMENT POLICIES,
by C. B. McGuire. 30 Aug 57, 61p P-1138
Unclassified report

Paper was prepared for use as Chapter 11 in a book entitled 'The Economics of Defense in the Nuclear Age,' by Charles Hitch and Roland McKean, intended for publication.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transport planes, Air Force procurement), (*Air Force procurement, Aircraft), Logistics, Costs, Economics, Mathematical models, Operation.

AD-606 482 Div. 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TO STRENGTHEN THE POWER OF AVIATION,
by K. A. Vershinin. 9 Sep 64, 11p
FTD TT64 474; TT 64 71472
Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 27 (12243) 1 Feb, p. 2.

Descriptors: (*Air force training, USSR), Aviation personnel, Air force personnel, Defense systems, Air transportation, Armament, Communism, Armed forces (Foreign).

The article discusses the tactical training of aviation units and subunits. Improvement and perfection of tactical habits in the use of rocket-carrying equipment were developed with consideration of the complex circumstances of a modern battle and newest means of the Soviet armed forces. During the past trainings, carried out in cooperation with other types of services, Soviet aviators have demonstrated a better tactical training, skill in expertly handling the entrusted equipment.

AD-606 531 Div. 18, 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WAR GAMING,
by Herman Kahn and Irwin Mann. 30 Jul 57, 14p
P-1167
Unclassified report

Descriptors: (*Armed forces operations, Game theory) (*Game theory, Armed forces operations), Operations research, Military strategy, Probability.

An introduction to the basic principles of war gaming covering the following topics: The informal game, rule games, the formal minimum rule game, and realistic war games.

AD-606 581 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RAND COST ANALYSIS DEPARTMENT DATA BANK,
by S. C. Slivinski. Sep 64, 9p P-2985
Unclassified report

Prepared for presentation at a meeting of the Joint Study Group on Military Resource Allocation Methodology at the RAND Corp., Santa Monica, Calif., 7 Oct 64.

19. Navigation

AD-606 353 Div. 19
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PRINCIPLES OF SELF-CONTAINED NAVIGATION,
by H. H. Bailey. 29 Mar 57, 21p P-1044
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Navigation, Reviews), Position finding, Celestial navigation, Inertial navigation, Dopler navigation, Gyro compasses, Acceleration, Differential equations.

Following a brief introduction on the nature and magnitude of the current effort in self-contained navigation, the basic functions of all navigation are analysed. Several methods of fixing are discussed, and it is shown that celestial navigation is limited by an inherent difficulty in establishing an accurate vertical on board a moving (accelerating) vehicle. Several methods of dead-reckoning are also analysed, and it is pointed out that the first to be free of fundamental (as opposed to instrumental) limitations is that using a doppler radar and a gyroscopic heading reference. Finally, the basic principles of inertial navigation are developed and presented in a simple, physical way. These systems solve the problem of establishing an accurate vertical by measuring vehicle accelerations; and simultaneously (and inseparably), by establishing an accurate vertical, they permit meaningful acceleration measurements to be made. The physical basis for Schuler Tuning is explained in elementary terms. The fundamental differential equation of inertial systems is derived. (Author)

AD-606 629 Div. 19, 1, 5, 28
OTS Prices: HC $3.00/MF $0.75

HRB-Singer, Inc., State College, Pa.
A HUMAN FACTORS REVIEW OF THE AN/TSQ-47 AIR TRAFFIC CONTROL/COMMUNICATIONS SYSTEM.
Rept. no. 6 (Final),
by Allen C. Busch and Robert B. King.
Jun 64, 64p HRBI-353-R-6
Contract AF19 628 439, Proj. 482L
ESD TDR64 446 Unclassified report

Descriptors: (*Air traffic control systems, Human engineering), (*Air traffic controllers, Air traffic control systems), (*Communication systems, Control systems), Air traffic, Airport radar systems, Mobile, Shelters, Safety, Noise, Design.

Category I testing has recently been completed on the AN/TSQ-47 Mobile Air Traffic Control/Communications System. This report presents a review of human factors problems which occurred during the Category I testing phase and in prior development phases of the system. The design changes suggested are based on recommendations made prior to the completion of Category I testing for the purpose of outlining tentative system deficiencies. Each shelter is reviewed separately, and problems common to all system facilities are discussed. The major topics of review are the operational considerations for each shelter, the working environment, and the design of consoles and work places. (Author)

AD-606 813 Div. 19, 8, 12
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
SUN FINDER OUTPUT CIRCUITRY.
Thesis,
by Robert Burns McCullough. May 60, 45p
Contract AF04 647 303, Proj. 52 156
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Position finding, Sun), (*Celestial guidance, Sun), (*Navigational computers, Circuits), Design, Mars probes, Automatic navigators, Digital computers, Magnetic cores, Solar cells, Prisms(Optics), Magnetic core storage, Switching circuits, Wiring diagrams.

This thesis analyzes a specific design problem and proposes a solution in the problem of transforming the output of a sun finder into the input required by a magnetic core digital computer. The proposed solution consists of three essentially separate circuits. The first circuit introduces a constant angle dead zone into the sun finder output. The second turns the dead zone on and off as directed by the computer. The third stores the sun finder output energy and uses it to switch the input cores of the computer. (Author)

paper discusses the Merits of the book in terms of its significance in matters of both military and foreign policy.

AD-606 856 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
'WAR-1974', BY ROBERT B. RIGG.
A book review,
by G. C. Reinhardt. 2 Apr 58, 8p P-1326
Unclassified report

Review of the book entitled 'War-1974' by Robert B. Rigg.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Reviews, Nuclear warfare), (*Nuclear warfare, Theory), Military tactics, Nuclear weapons.

'War-1974' by Lt. Col. Robert B. Rigg is short on humor, intentional or otherwise. Those concerned with the international impact of a technological breakthrough (in tactics as well as hardware) will be interested. Col. Rigg submits a forecast substantiated, he says, by (quoted) progress that offers a provoking checklist of possible vs. impossible developments. (Author)

AD-606 867 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RECIPROCAL FEAR OF SURPRISE ATTACK,
by T. C. Schelling. 16 Apr 58, rev. 28 May 58,
30p P-1342
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Warfare, Fear), Psychological warfare, Threat evaluation, Game theory, Decision theory, Probability.

At the Twentieth Party Congress in January, 1956, a directive was given to 'build atomic power plants with a total capacity of 2,000,000 kw to 2,500,000 kw in 1956-1960.' When this order was published, observers in the West naturally questioned whether 'total' referred to the rated thermal or electrical capacity of the atomic power stations. The United States and British programs have been publicized in terms of how much electricity (or useful power) will be produced rather than what the total heat capacity of the power reactors might be. The latter figure would be more than three times the electrical rating, depending on the thermodynamic efficiency of the system. The dangers inherent in utilizing this ambiguous Soviet data are discussed.

AD-606 389 Div. 20, 14
OTS Prices: HC $3.00/MF $0.75

Plesset (E. H.) Associates, Inc., Los Angeles, Calif.
RADIATION DAMAGE TO PLASTICS,
by Edward Gerjuoy, Olen Nance, and Horace A. Ory.
Mar 61, 82p PLES-TR-108, PLES-C13-61(U)202
Contract AF29 601 1897

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plastics, Radiation damage), (*Radiation damage, Plastics), Nuclear absorption, Mathematical analysis, Ionization, Excitation, Chemical bonds, Rupture, Chemical reactions, Structural properties, Electrical properties, Thermal properties, Mechanical properties, Nuclear particles, Photons, Transport properties, Organic compounds, Hydrocarbons, Organic oxygen compounds, Paramagnetic resonance, Absorption spectrum, Polymers, Thermoplastics, Thermosetting plastics, Polyethylene plastics.

The basic phenomena involved in radiation damage to plastics are reviewed in detail and interpreted in terms of modified responses of irradiated plastics to subsequent stresses. The topics considered include mode of energy deposition and partition between thermal and specific effects; the primary physical processes which are involved in ionization, electronic excitation, and bond rupture; the types of species produced and their chemical behavior; the structural changes which result from induced chemical reactions; and the evaluation of radiation damage as reflected by variation of electrical, thermal, and mechanical parameters of materials with radiation dose. (Author)

AD-606 401 Div. 20, 25
OTS Prices: HC $2.00/MF $0.50

High-Energy Physics Lab., Stanford Univ., Calif.
A DETERMINATION OF RADIATIVE TRANSITIONS WIDTHS OF EXCITED STATES IN C(12),
by H. L. Crannell and T. A. Griffy. Jul 64, 27p
HEPL-335
Contract Nonr225 67

Unclassified report

Supported in part by the Air Force Office of Scientific Research and the National Science Foundation.

Descriptors: (*Carbon, Electron transitions), (*Electrons, Nuclear scattering), Atomic energy levels, Elastic scattering, Inelastic scattering.

New absolute values for the elastic and inelastic electron scattering cross sections from C(12) are presented for a range of q square from 0.75 F to the -2 power to 3.14 F to the -2 power. A new method of analysis has been employed to obtain the radiative widths for the first three excited states in C(12) from the measured inelastic cross sections. This method of analysis does not depend on a model for the transition charge distribution and is useful in determining the multipolarity of the transition. (Author)

AD-606 431 Div. 20, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE PRINCIPLE OF INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY; I: ONE-DIMENSIONAL CASE,
by Richard Bellman, Robert Kalaba, and G. Milton Wing.
11 Jun 57, 33p P-1102

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Neutron transport theory, Nonlinear differential equations), Neutron scattering, Critical assemblies, Fission, Neutron capture, Stochastic processes, Mathematical models.

Consideration is given to a one-dimensional version of the reflection and transmission of neutrons, and the phenomenon of critical mass. Although the effects of fission, capture and forward and backward scattering are considered, collisions between neutrons are not taken into account. The basic model is stochastic, with standard transport theory derived on the basis of expected values. As the explicit form of the higher moments indicates, an expected value theory yields a quite inadequate view of the distribution of reflected and transmitted neutrons in the neighborhood of critical mass. Some numerical results describing these distributions obtained from the solution of forty simultaneous nonlinear differential equations are presented.

AD-606 475 Div. 20, 25
OTS Prices: HC $3.00/MF $0.75

Nevis Labs., Columbia Univ., Irvington-on-Hudson, N. Y.
MUON DEPOLARIZATION IN SOLIDS.
Doctor's thesis,
by Bob Eisenstein. May 64, 86p CU-230, Nevis-124
Contract Nonr266 72

Unclassified report

Prepared in cooperation with National Science Foundation.

Descriptors: (*Muons, Particle beams), Radioactive decay, Positrons, Distribution, Polarization, Quenching (Inhibition), Electron capture, Solids, Semiconductors, Aluminum, Sulfur, Aluminum compounds, Oxides, Boron compounds, Carbides, Dielectric properties.

When polarized positive muons stop in a solid, they may be depolarized prior to their decay. The presence of a magnetic field along the direction of initial polarization will inhibit, or quench, some of this depolarization. A study was made of depolarization and quenching in a variety of solids, including semiconductors, at temperatures as low as 4.2K. No evidence was found that any muon depolarization is associated with the formation of a muonium atom which is bound for > 10 to the-10th power sec, even in samples at 4.2K. For many samples and temperatures, the quenching of the observed depolarization is consistent with a model in which the muon captures and loses electrons repeatedly, forming a succession of

20. Nuclear Physics and Nuclear Chemistry

AD-606 149 Div. 20
OTS Prices: HC $6.00/MF $1.25

Pennsylvania Univ., Philadelphia.
STUDIES IN PHOTONUCLEAR REACTIONS.
Annual rept.
Jun 60, 246p
Contract AF49 638 454
AFOSR TN60 889; AD 239 360

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photonuclear reactions, Betatrons), (*Betatrons, Calibration), (*Electrons, Inelastic scattering), Neutron cross sections, Photons, Deuterium, Bismuth, Carbon, Oxygen.

Research progress in the following fields is reported: neutron separation energies and betatron energy calibration; phtotactivation studies of carbon and oxygen; inelastic scattering of electrons from nuclei.

AD-606 161 Div. 20
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
VARIABLE ENERGY EXTRACTION FROM THE UCLA 50 MeV CYCLOTRON.
Technical rept.,
by A. C. Paul and B. T. Wright. Dec 63, 36p P-66
Contract Nonr233 44

Unclassified report

Descriptors: (*Proton beams, Cyclotrons), (*Cyclotrons, Proton beams), Hydrogen, Ions, Foils, Magnets, Particle trajectories, Feasibility studies.

A scheme for the extraction of a 25 to 47 MeV proton beam into a common external beam-transport system was studied for use with the UCLA 50 MeV cyclotron. The extraction is accomplished by stripping negative hydrogen ions with a thin foil. The magnetic field is held constant while the radius and azimuth of the stripping foil are chosen so that the trajectories for any energy cross at a common point outside the cyclotron vacuum tank. A small combination magnet placed at this crossover point bends the trajectories into a common beam-transport system. The feasibility of this scheme was studied by computing the ion-optic matrix for the cyclotron fringing field for 25, 30, 35, 40 and 45 MeV. The beamspot size calculated indicates a one hundred per cent extraction efficiency in this energy range. (Author)

AD-606 253 Div. 20, 30, 31
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
RECENT APPLICATIONS OF RADIOISOTOPES,
by Leonard B. Gardner. 24 Aug 64, 13p
Proj. Y F015 12 04 406
NCEL N606

Unclassified report

Descriptors: (*Radioactive isotopes, Instrumentation), Measurement, Soils, Density, Moisture, Snow, Thickness, Scientific research.

This Technical Note summarizes applications found during a literature search which are suitable for Naval use. Prime emphasis has been placed on determining those applications suitable for field applications. Secondary consideration is given to research applications. Specifically excluded from this report is the application of radioisotopes to space heating. During the literature search, applications were sought which would reduce costs, improve efficiency and quality control, and open new fields for the Naval Shore Establishment. (Author)

AD-606 256 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONFERENCE OF THE ACTION OF IRRADIATION ON A SUBSTANCE, DUBNA, MAR 62,
by N. F. Pravdyuk, Yu. N. Pokrovskii, and P. A. Platonov. 19 Jul 63, 9p
FTD MT63 71; TT 64 71456

Unclassified report

Machine trans. of Atomnaya Energiya (USSR) 1962, v. 13, no. 6, p. 608-609.

Descriptors: (*Radiation damage, Symposia), Reactor Materials, Metals, Semiconductors, USSR.

AD-606 268 Div. 20, 2, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RANDOM FUNCTIONS OF COSMIC-RAY CASCADES,
by T. E. Harris. 7 Feb 57, 11p P-1020

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cosmic ray bursts, Statistical functions), Photons, Electrons, Bremsstrahlung, Probability, Statistical processes.

The usual model for the soft component of cosmic radiation, appropriate to the assumption of complete screening, is studied. First treating the case where collision loss is neglected, the expected values for the number of electrons and photons are related to the probability distribution of a certain nonmultiplicative Markov process, limit-theorems for this process having an interpretation in terms of the original multiplicative process. The total energy in all electrons is shown to converge in probability to a positive constant. If collision loss is included, certain peculiarities are pointed out in the fluctuations of the number of electrons. (Author)

AD-606 374 Div. 20, 7
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET ATOMIC POWER PROGRAM: LARGE OR SMALL,
by Arnold Kramish. 1 May 1957, 9p P-1076

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear power plants, USSR), (*USSR, Nuclear power plants), Electric power production, Thermoelectricity, Nuclear reactors, Turbines.

AD-606 696 Div. 20, 17
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
IN-DEPTH EMBRITTLEMENT TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL,
by C. Z. Serpan, Jr. and L. E. Steele. 4 Sep 64, 22p
Contract AT49 5 2110, Projs. RR007 01 46 5409, SR007 01 01, Task 0858
NRL 6151

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Reactor system components), (*Reactor materials, Steel), (*Steel, Brittleness), (*Radiation damage, Reactor materials), Ductility, Power reactors, Transition temperature, Thickness, Manganese alloys, Nickel alloys, Chrominum alloys, Molybdenum alloys.

Because of the self shielding and attenuation properties of the vessel material, a nuclear reactor pressure vessel will have a neutron flux and spectrum variation across its thickness. As a result of this variation, a pressure vessel should show various degrees of neutron-induced embrittlement throughout its thickness, and it is postulated that the embrittlement will be greatest at the inner wall and least at the outer wall. This phenomenon has been investigated by the irradiation of a large block of A302-B steel at the core face of a pool reactor in a position simulating the location of an actual pressure vessel. The steel block, 6 in. thick, was made to accommodate five equally spaced assemblies of Charpy V-notch specimens which, in turn, represented the vessel material at comparable positions. The notch ductility test results of the irradiated specimens demonstrate a significant degree of embrittlement as well as a significant decrease in the degree of embrittlement through the simulated pressure vessel wall. However, the observed decrease is small when related to the respective variation in neutron dosage. A correlation of the notch ductility data developed in this study to that between test reactor experiments and in-service power reactor conditions is indicated. (Author)

AD-606 712 Div. 20, 2
OTS Prices: HC $6.00/MF $2.00

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 9,
by Herbert W. Feely, Ben Davidson, James P. Friend, Raymond J. Lagomarsino, and Micah W. M. Leo. 1 Sep 63, 429p
Contract DA49 146XZ079
DASA 1309

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radioactive fallout, Mathematical models), (*Radiological contamination, Stratosphere), (*Stratosphere, Radiological contamination), Aerosols, Air pollution, Nuclear explosions, Radioactive isotopes, Strontium, Barium, Antimony, Beryllium, Manganese, Iron, Tropopause, Cosmic rays, Atmosphere models, Carbon dioxide, Soils.

Work which was done on Project Star Dust during the preceding contract year is reviewed. Filter samples of stratospheric radioactivity were collected using WU-2, RB-57 and RB-52 aircraft. Lower altitude collections included intensive sampling in the vicinity of extrusions of stratospheric air into the troposphere during the spring of 1963. A number of radiochemical and radiometric procedures used during Project Star Dust and developed since the issuance of the final report on Project HASP are described. (Author)

AD-606 766 Div. 20
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE SOVIET UNION AND THE ATOM: TOWARD NUCLEAR MATURITY,
by Arnold Kramish. 25 Apr 58, 116p RM-2163

Unclassified report

Rept. on Proj. Rand.

Descriptors: (*Nuclear energy, USSR), (*USSR, Nuclear energy), Nuclear engineering, Nuclear power plants, Nuclear reactors, Nuclear physics laboratories, Nuclear industrial applications, Nuclear weapons, Nuclear bombs, Nuclear explosions, Cyclotrons, Nuclear propulsion, Radioactive isotopes, Uranium, Linear accelerators, Synchrotrons, Thermonuclear reactions.

The Soviet Union has never issued formal periodic reports as do all western governments on the organization and progress of the atomic energy program. Even though in the west the military aspects of atomic energy are still classified, reports are available which give at least the organizational structure, the institutes, and the sites involved in weapons research and development. It is consequently with the greatest of difficulty that information on the Soviet program can be obtained. That which is presented here must be considered extremely sketchy, and, in the interests of accuracy, no speculative reports have been referenced. While this paper does not presume to be the Soviet counterpart of the 'Smyth Report,' it is believed that this final section of 'The Soviet Union and the Atom' presents close to the maximum amount of general descriptive information which can be combed from publicly available materials on the USSR atomic energy program.

AD-606 773 Div. 20, 17
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.
IN-REACTOR STUDIES OF LOW CYCLE FATIGUE PROPERTIES OF A NUCLEAR PRESSURE VESSEL STEEL.
Final rept.,
by J. R. Hawthorne and D. E. Steele. 27 Jul 64, 30p
Contract AT 49 5 2110, Projs. RR007 01 46 5409, SR007 01 01, Task 0858
NRL 612 7

Unclassified report

Prepared in cooperation with the Navy Bureau of Ships and the U. S. Steel Corp.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Reactor system components), (*Reactor materials, Steel), (*Steel, Reactor materials), (*Radiation damage, Steel), (*Fatigue (Mechanics), Reactor materials), Heat treatment, Manganese alloys, Nickel alloys, Chromium alloys, Molybdenum alloys, Metal plates, Power reactors, Test equipment.

An experimental irradiation assembly and associated instrumentation which have been developed and successfully utilized for the performance of dynamic in-reactor low cycle fatigue tests of reactor pressure vessel steels are described. The equipment provides for the simultaneous reverse bend testing of as many as fifteen sheet type specimens representing a range of strain amplitudes at controlled temperatures in the range 300 to 700F. The results of an exploratory investigation on the fatigue resistance of ASTM type A302-B steel during irradiation at 500F are presented and compared with data from out-of-reactor control tests. These preliminary data do not indicate any pronounced difference in the fatigue strength of irradiated versus unirradiated steel. Exploratory investigations are continuing. (Author)

briefly bound muonium atoms. In some of the semiconductors at low temperatures, as well as in other samples, a large fraction of the depolarization is quenched by a field of 100 G. This is seen as evidence for another depolarization mechanism. (Author)

AD-606 548 Div. 20, 12
OTS Prices: HC $3.00/MF $0.75

Boeing Co., Seattle, Wash.
ANALYSIS OF SOLAR-FLARE HAZARD TO MANNED SPACE SYSTEMS,
by E. L. Chupp, D. L. Dye, B. W. Mar, L. A. Oncley, and R. W. Williams. 1961, 83p D2-11608
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solar flares, Manned spacecraft), (*Manned spacecraft, Solar radiation), (*Radiation hazards, Solar flares), Space environmental conditions, Radiation effects, Protons, Dose rate, Radiobiology, Sunspots, Nuclear particles, Particle size, Lethal dosage, Shielding, Measurement, Probability, Statistical analysis.

An evaluation of the solar-flare proton radiation hazard is presented. By a detailed analysis of all available rocket, balloon, and riometer data for solar-flare proton events from February 1956 to September 1960 an estimate is made of the total proton flux and a power law differential spectrum is estimated for each event. Brief consideration of radiobiological effects of the non-uniform dose distributions resulting from flare proton spectra leads to the assignment of the absorbed dose at 4-centimeter depth in tissue as representative of the medically significant dose for flare events. A typical space vehicle design is analyzed for its solar-flare proton shielding effectiveness, and a factor of three to ten reduction in dose is found. It is concluded that the probability of encountering a dangerous dose level in the course of a week's space flight is comparable to, or less than, the probability of a fatal accident in a week of flying in an operational military aircraft. Use of a solar-flare proton event prediction criterion will reduce the hazard by a factor of three for a short mission; the use of a small amount of extra shielding will reduce the dose encountered by a further factor of up to ten.

AD-606 605 Div. 20, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A LINEAR PROGRAMMING MODEL OF THE GASEOUS-DIFFUSION ISOTOPE-SEPARATION PROCESS,
by Donald Fort. 12 Dec 57, 26p P-1231
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Isotope separation, Linear programming), (*Gaseous diffusion separation, Linear programming), (*Linear programming, Gaseous diffusion separation), Nuclear reactors, Reactor fuels, Uranium, Purification.

The purpose of the paper is to show how the gaseous diffusion process for separating uranium isotopes may be treated as a linear programming model. The model is developed by the theoretical or engineering approach, as opposed to empirical methods based on statistical analysis of observations. The model may be useful in the economic analysis of complicated systems involving various feedbacks between gaseous diffusion plant, neclear reactors, and other facilities involved in the production of nuclear materials and nuclear power. The paper is in three parts. First is a brief description of the physical separation process. Next it is shown how the physical relationships may be translated into linear programming terms. Finally it is briefly indicated how the linear programming model of the gaseous diffusion separation process may enter into larger models of the nuclear materials and power industry. (Author)

AD-606 615 Div. 20
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY. II: FUNCTIONAL EQUATIONS,
by Richard Bellman, Robert Kalaba, and G. Milton Wing. Rev. 5 Mar 58, 32p P-1252
Unclassified report

Prepared in cooperation with the Atomic Energy Commission.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-606 431.

Descriptors: (*Neutron transport theory, Nonlinear differential equations), (*Fission products, Neutron transport theory), Boundary value problems, Probability, Equations, Functions, Invariance, Critical assemblies, Neutron flux, Mathematical models.

Some one-dimensional fission processes are considered with particular regard to questions of critical length and energy dependence of the products of fission. Various interconnections between the functions used in the invariant imbedding approach and the classical approach are indicated. In particular it is shown how one may pass from the consideration of certain linear two-point boundary value problems to nonlinear (Riccation type) initial value problems. The former are useful for theoretical considerations, the latter for numerical computation. (Author)

AD-606 674 Div. 20
OTS Prices: HC $3.00/MF $0.75

General Dynamics/Fort Worth, Tex.
NUCLEAR-INDUCED AIR-IONIZATION CURRENTS,
by P. R. Cheever. 31 Mar 64, 70p
NARF-63-16T, FZK-9-190
Contract AF33 657 7201
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiation damage, Electrodes), (*Gas ionization, Radiation damage), (*Ionization chambers, Ionic currents), Cobalt, Electric fields, Pressure, Voltage, Nitrogen, Experimental data, Tests, Analysis, Nuclear physics laboratories.

The results of an analytical and an experimental investigation of ionization currents for pairs of parallel cylindrical electrodes subjected to 200,000 r/hr of cobalt-60 radiation are compared. Two electric-field assumptions were used to derive two ionization-current equations. Fair agreement was achieved between measured and calculated values. The effects of pressure, voltage, electrode diameter, and electrode separation are illustrated in numerous ionization curves. (Author)

22. Ordnance

AD-606 160 Div. 22, 9, 30
OTS Prices: HC $1.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
A COMPUTER PROGRAM TO DETERMINE DRAG COEFFICIENTS FROM RANGE TABLE DATA,
Technical memo.,
by Lorraine S. Paladino. Sep 64, 20p
NWL K-57/64

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Projectiles, Drag), (*Drag, Programming (Computers)), (*Programming (Computers), Drag), Range tables, Ballistics, Mathematical models, Mathematical analysis, Statistical data, Projectile trajectories.

A description, including a flow diagram and FORTRAN IV listing, is given for a program designed to determine drag coefficients and corresponding Mach numbers of a weapon from range table position and velocity data. (Author)

AD-606 335 Div. 22, 24
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
APPLICATION OF A DISCRETE LINE EMISSION SOURCE TO DAYLIGHT BALLISTIC PHOTOGRAPHY,
by D. S. Webber and R. A. Satten. 9 May 58, 23p
STL/GM-TR-0165-00381

Unclassified report

Prepared in cooperation with California Univ., Los Angeles.

Descriptors: (*Ballistic cameras, Design), (*Photoflash cartridges, Ballistic cameras), (*Line spectrum, Potassium), Light, Excitation, Heat of activation, Dissociation, Potassium compounds, Magnesium compounds, Aluminum compounds, Halogen compounds, Intensity, Photographic filters, Narrowband, Guided missiles, Tests, Ballistics, Photography.

On the basis of long-range ballistic missile testing requirements, criteria are presented for an operational daylight capability for ballistic cameras. It is shown that these criteria can be met with present camera equipment, narrow band interference filters, and improved photoflash cartridges. The necessary improvement of the cartridges consists of increasing the output in the potassium resonance lines of the standard 'Daisy' photoflash cartridge by a factor of about six. Theoretical considerations and experimental data are presented which indicate that such improvement is quite feasible. Recommendations are made for a program to achieve the improvement of the light source and to develop the necessary techniques for a complete ballistic camera daylight capability. (Author)

AD-606 588 Div. 22, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE INTENSE STRESS FIELD PRODUCED IN THE ELASTIC EARTH BY A BOMB BLAST AT THE SURFACE,
by Hyman Serbin. 23 Aug 57, 32p P-1210

Unclassified report

Submitted to the Journal of Seismology.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Surface burst, Shock waves), (*Shock waves, Stresses), (*Elasticity, Shock waves), Earth, Structures, Blast, Air burst, Mathematical models, Equations, Mathematical analysis, Functions, Velocity, Pressure, Theory.

A theory for the free stress field in the earth developed by a bomb blast at the surface is presented. The theory is based on the assumption that the earth is an elastic solid. The analysis is confined to the intense stress field developed shortly after the burst. Stresses and displacements are calculated in explicit form and can be compared with test data when such is available. (Author)

AD-606 663 Div. 22
OTS Prices: HC $4.00/MF $0.75

Watervliet Arsenal, N. Y.
BORE EVACUATOR VALVE TEST, CANNON 155MM HOWITZER, M126.
Technical rept.,
by J. M. Giesey, E. R. Lawson, and R. L. Rosenblum.
Aug 64, 104p
WVT II6412

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Howitzers, Valves), (*High-pressure valves, Gun barrels), (*Firing tests (Ordnance), Howitzers), Test methods, Strain (Mechanics), Strain gages, Design, Life expectancy, Performance (Engineering), Pressure, Stresses, Gun components.

The limited life of Bore Evacuator Valve Assembly 8769384 during firing tests led to the authorization of a test program to find a valve assembly with a longer life. The cost of testing in the gun (155mm How. M126) made it economical to build a test apparatus which simulated the weapon. The test program was the basis for the incorporation of valve assembly 8769531 into the weapon system. A comparison of the strain level of the modification is presented. The life of the then current production valve assembly and the new production valve assembly under different charges is also given. (Author)

21. Nuclear Propulsion

AD-606 336 Div. 21, 12, 27
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THRUST OPTIMIZATION OF A NUCLEAR ROCKET OF VARIABLE SPECIFIC IMPULSE,
by H. R. Lawrence, C. J. Wang, and G. W. Anthony.
29 May 58, 25p

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Rocket propulsion, Nuclear propulsion), (*Nuclear propulsion, Thrust), (*Thrust, Nuclear propulsion), Nuclear reactors, Specific impulse, Gas flow, Dissociation, Velocity, Spacecraft, Rocket propellants, Mathematical analysis.

A simple relation is derived between the specific impulse and the flow rate of a gas under the reactor operating conditions allowing molecular dissociation of the gas. Utilizing this relation, an optimum variable thrust program to maximize velocity is obtained for a vertically ascending vehicle under the assumptions of constant gravity and zero aerodynamic drag. The advantage of this program is demonstrated by comparison with the usual constant thrust program. (Author)

24. Photography and Other Reproduction Processes

AD-606 522 Div. 24, 2
OTS Prices: HC $1.00/MF $0.50

Lick Observatory, Mount Hamilton, Calif.
ELECTRONOGRAPHIC IMAGE TUBES FOR ASTRONOMY.
Rept. for 1 Oct 63-30 Sep 64,
by Gerald E. Kron. 1 Oct 64, 4p
Contract Nonr2892 01
Unclassified report

Descriptors: (*Image tubes, Electrophotography), (*Astronomical cameras, Image tubes), Performance (Engineering), Photocathodes, Distortion, Photographic emulsions, Resolution, Moon, Stars, Telescopes, Storage tubes.

Progress is reported on a series of experimental trials in an attempt to make an electronographic type of image tube, or electronic camera, of our design and construction, yield astronomical pictures containing information that cannot be recorded by photographic methods. The performance of the image tube is studied and changes made in its construction and operation to improve its performance.

AD-606 694 Div. 24, 6, 8
OTS Prices: HC $4.00/MF $0.75

General Precision, Inc., Glendale, Calif.
STEREOPLOTTER, PROJECTION AP-14().
Final rept. for 10 Dec 62-15 Sep 63,
by F. M. Salomon. Apr 64, 104p
Contract AF30 602 1771
RADC TDR64 154 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stereoscopic map plotters, Design), (*Stereoscopic projectors, Stereoscopic map plotters), Mapping, Scanning, Instrumentation, correlators, Cathode ray tubes, Plotting boards, Circuits, Automatic, Video signals, Photographic techniques, Servomechanisms, Operation.

The application of a raster servo system to the areas of contour detection and tracing is considered from both a theoretical and experimental point of view. The basic electronic systems required for such an instrumentation are considered in detail, and the limitations imposed by the existing instrumentation are discussed quantitatively. Experimental data, obtained with the aid of the prototype model constructed for this study, indicates that a raster servo contour tracing system provides a rapid and accurate means of extracting steremodel contour information. (Author)

AD-606 846 Div. 24, 22
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SIMPLE DEVICE FOR ASSESSING GUN-CAMERA FILM AGAINST BANNER TARGETS,
by J. L. Jenkins. 21 Feb 58, 8p P-1285
Unclassified report

To be published in 'Fighter Weapons Newsletter', Jun 58, USAF Fighter Weapons School, Nellis Air Force Base, Nevada.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerial gunnery, Photographic analysis), (*Aerial photography, Photographic analysis), Aerial cameras, Photographic analysis, Aerial targets, Tracking, Training devices.

23. Personnel and Training

AD-606 352 Div. 23, 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON THE SOCIOLOGY OF MANAGEMENT,
by David G. Hays. Rev. 11 Jul 57, 17p P1043
Unclassified report

Descriptors: (*Industrial relations, Automation), (*Sociology, Automation), (*Automation, Industrial relations), Management planning, Management control systems, Labor, Personnel, Theory.

Five functions of management are: planning, organizing, staffing, directing, and controlling. Managers perform these functions by manipulating the organizations which sociologists study; hence, the sociologist should be a useful aide to the manager. Automation raises problems which illustrate the relationship: problems of changing authority and career lines, and problems of human judgment. (Author)

AD-606 357 Div. 23, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ECONOMICS OF NAVY PAY,
by Alain C. Enthoven. 2 Apr 57, 19p P-1051
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wages, Naval personnel), (*Economics, Wages), Personnel management, Performance (Human), Attitudes.

The economic aspects of the navy pay structure are discussed with respect to longevity, morale, personnel performance, and retention of experienced personnel.

AD-606 481 Div. 23, 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IDEOLOGICAL AND ORGANIZATIONAL ACTIVITY OF MILITARY CADRES,
by R. Ya. Malinovskii. 9 Sep 64, 17p
FTD TT64 473; TT 64 71471
Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 53 (12269) 3 Mar, p. 2.

Descriptors: (*Officer personnel, USSR), (*Military training, Communists), Armed forces (Foreign), Military personnel, Communism, Propaganda, Education, Government (Foreign).

The discussion is aimed at improving the business and political qualities of military cadres, in order to enrich them with ideological experience and organizational work, with methods of fighting for the achievement of new boundaries in tactical and political training of military personnel. It is hoped that they will convert into life the policies of the Communist party in the field of military construction.

AD-606 625 Div. 23, 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
WHAT THE FACTORY WORKER KNOWS ABOUT HIS FACTORY,
by Donald R. Fagg, Carl Kaysen, and Roland N. McKean.
7 Feb 58, 62p P-1275
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Public opinion, Reliability), Factories, Personnel, Statistical data, Scattering, Management engineering, Decision making.

An attempt was made to measure the variability in the knowledge that workers have about their factory. The original purpose of the study was to learn more about the confidence that could be attached to information about one country's economy that often reaches another nation's hands. Refugees, for example, often bring with them scraps of information about their former situation, and clues to the reliability of such data are important. But the results of the study may be pertinent in many other connections. Businessmen may be interested in knowing whether or not employees ordinarily have accurate information about their company. They may wish to know whether or not reliable data can be obtained from a small sample of a firm's employees. The results may also be pertinent to the businessman's interpretation of any kind of poll or survey that seeks factual information (as contrasted with 'attitude surveys'). Finally, since it is sometimes necessary to form opinions and make decisions on the basis of the testimony of a few witnesses, the reports of a few observers, or the estimates of a few participants, recognition of the variability of any estimate, however derived, may be extremely important in decision-making.

AD-606 657 Div. 23, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPUTER TRAINING AND EDUCATION: THE PICTURE IN 1962,
by F. J. Gruenberger. Jul 62, 12p P-2597
Unclassified report

Prepared for presentation at the Northwest Computing Association Annual Meeting, Seattle, 9 Aug 62.

Descriptors: (*Computer personnel, Training), Education, Training devices, Universities, Reviews.

AD-606 734 Div. 23, 18, 32
OTS Prices: HC $2.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS, FY 1964,
by Emma E. Brown. Aug 64, 46p
Projs. 2J024701A721, 2J024701A722
APRO TRN 149
Unclassified report

Descriptors: (*Bibliographies, Military publications), (*Military publications, Bibliographies), (*Military personnel, Selection), Abstracting, Army research, Psychometrics, Performance tests, Libraries.

of glow discharge tubes. In the literature of this field these waves have been called 'moving striations' because of the visible radiation emanating from the traveling pulse. Both experimental and theoretical analyses of this phenomenon were made. The principal experimental result of this work is the establishment of a linear regime of operation for the observed traveling waves and the artificial excitation of them. The principal theoretical result is the derivation and the analysis of a linear theory that is applicable to the experimental regime of operation. (Author)

AD-606 225 Div. 25
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE MECHANISM FOR INSTABILITY OF TRANSVERSE PLASMA WAVES,
by Burton D. Fried. 20 Feb 59, 7p
STL/TN-59-0000-00235
Contract AF04 647 309

Unclassified report

Descriptors: (*Plasma oscillations, Dynamics), (*Particle trajectories, Plasma physics), Electrons, Magnetic fields, Velocity, Distribution, Equations, Statistical functions.

A physical mechanism is presented for the growth of transverse plasma waves due to an anisotropic velocity distribution. It is shown that in absence of an external magnetic field, curvature of particle trajectories in the fluctuation magnetic field accounts quantitatively for the growth rate calculated from the Boltzmann equation. (Author)

AD-606 227 Div. 25, 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ELASTIC BUCKLING OF TWO-LAYER CYLINDERS AND CURVED PLATES,
by W. Zophres. 31 Dec 58, 20p STL/GM-TR-0165-00539, STL-EM-8-27

Unclassified report

Descriptors: (*Buckling (Mechanics), Stiffened cylinders), (*Stiffened cylinders, Elasticity), Cylindrical bodies, Structural shells, Stresses, Stability, Equations, Reinforcing materials, Laminates, Aerospace craft.

It is shown that the Donnell equation of a thin cylindrical element composed of two well-bonded layers of different materials but which have equal Poisson ratios is identical in form to the single-layer equation except in the stiffness constants. It is possible then to utilize the results of single-layer buckling analyses for cylinders and curved plates by proper substitution of the bending and extensional stiffnesses of the two-layer wall for the corresponding stiffnesses of the single-layer wall. The case of the cylinder in axial compression is discussed in some detail. (Author)

AD-606 228 Div. 25
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
PLASTIC ANALYSIS OF PRESSURE VESSEL INSTABILITY,
by R. P. Felgar. Oct 60, 82p
STL/TR-60-0000-19319, STL-EM-10-24

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Stability), Deformation, Plasticity, Theory, Elasticity, Stresses, Strain (Mechanics), Analysis.

Plasticity theory is used as a basis for analyzing the instability of pressure vessels for various ratios of biaxial stresses. Methods of analysis are developed which incorporate the behavior of the material with various degrees of precision. The methods are illustrated using Ladish D6AC. The predicted instability pressures are compared with the measured values. For the most precise method of analysis, predicted and measured values agree with 31/2% or better. The instability strains have a somewhat wider discrepancy. The analysis can be used as a design procedure to give an upper limit on the burst pressure. (Author)

AD-606 230 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INTERACTION OF SLOW ELECTRONS WITH ATOMIC OXYGEN AND ATOMIC NITROGEN.
Aerophysics Operation Research memo,
by Milton M. Klein and Keith A. Brueckner. 11 Apr 58, 32p R58SD222, GE Aerophysics ORM-11
Contract AF04 645 24

Unclassified report

Descriptors: (*Oxygen, Ionization), (*Nitrogen, Ionization), (*Electrons, Polarization), Field theory, Photons, Air, Scattering, Atomic energy levels.

The polarization potential for an electron in the field of an oxygen atom was determined by utilizing recent experimental results on the binding energy of 0(-). The corresponding polarization potential for atomic nitrogen was obtained from the results for oxygen by an extrapolation based on the theory of polarization. From these results the photo cross section for 0(-) and the scattering cross section sections for oxygen and nitrogen were calculated. The photo cross section is in good agreement with experimental results. The scattering cross sections are compared with other recent calculations. It is also shown on the basis of the general theory of the photo cross section that the energy dependence of the cross section determines the scattering length for electron scattering. The agreement of the computed photo cross section with experiment therefore is a direct check on the scattering prediction. (Author)

AD-606 231 Div. 25, 15, 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING, PARTICLE INTERACTION AND CONSERVATION RELATIONS,
by Richard Bellman and Sherman Lehman. Sep 64, 24p RM-3816-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Quantum mechanics, Difference equations), Particles, Transport properties, Differential geometry, Partial differential equations, Nonlinear differential equations, Numerical analysis.

It is shown that for a quite general class of transport processes involving particle-particle interaction, as well as the usual particle-medium interaction, difference approximations can be obtained which exhibit nonnegativity and boundedness in an immediate fashion. Furthermore, a unifrom Lipschitz condition is preserved.

25. Physics

AD-606 163 Div. 25, 4
OTS Prices: HC $7.55/MF $2.00

National Bureau of Standards, Washington, D. C.
TABLES OF IDEAL GAS THERMODYNAMIC FUNCTIONS FOR 73 ATOMS AND THEIR FIRST AND SECOND IONS TO 10,000K,
by Joseph Hilsenrath, Carla G. Messina, and William H. Evans. Aug 64, 452p
Contract AF29 601 60 4491, Proj. 5776, Task 577601
WL TDR64 44
Unclassified report

Descriptors: (*Thermodynamics, Tables), (*Atomic properties, Thermodynamics), Ions, Electrons, Gases, Atomic energy levels, Quantum statistics, Specific heat, Entropy.

Tables are presented of five thermodynamic properties for the electron, for 73 elements, H through La and Hf through Ac (with the exception of At and Fr) and, in most cases, for their first and second ions. The tables are given at 100 degree intervals starting at 100K for the atoms and at 100 or 1000 degree for the ions and extending to 10,000K. They were computed for the atoms and atomic ions considered as ideal monatomic gases by direct summation over the available energy levels. The summation over energy levels was made from the ground state up to the principal quantum number 5. Where the quantum number, n, for the ground state exceeds 5, summations were made only over levels having the same n as the ground state. The sensitivity of the thermal functions to the inclusion of higher energy states in the partition function is discussed briefly, illustrated graphically for the specific heats, and tabulated for the Gibbs free energy function. (Author)

AD-606 186 Div. 25
OTS Prices: HC $5.00/MF $1.00

Electronics Research Lab., Univ. of California, Berkeley.
INSTABILITIES IN THE ELECTRON-HOLE PLASMAS IN SEMICONDUCTORS,
by S. Kakihana. 25 May 64, 176p ERL-64-19
Contract Nonr222 57
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Plasma physics), (*Plasma medium, Stability), Magnetic fields, Field theory, Electric fields, Polarization, Plasma oscillations, Mathematica models.

Contents: helical instability in electron-hole plasmas in semiconductors-'oscillistor' type oscillations; oscillations in the absence of magnetic field-modes of oscillations resembling two-stream instabilities in plasma.

AD-606 198 Div. 25, 1, 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BRIEF REVIEW OF MASS TRANSFER COOLING,
by James P. Hartnett. Jan 62, 31p P-2473
Unclassified report

Paper prepared for presentation at the 'Journees d'Etudes Internationales de la Transmission de la Chaleur' held in Paris during the week of 19 Jun 61.

Descriptors: (*Heat transfer, Cooling), (*Cooling, Transport properties), (*Transport properties, Cooling), Hypersonic flow, Fluid flow, Boundary layer, Gases, Porous materials, Film cooling, Laminar flow, Turbulent flow, Ablation, Evapotranspiration, Heat transfer, Aerodynamic heating.

The following cooling methods are discussed: Film cooling; Transpiration cooling; Liquid film cooling; Ablation cooling.

AD-606 219 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Microwave Lab., Stanford Univ., Calif.
PHOTOMIXING IN A BULK SEMICONDUCTOR PHOTODETECTOR.
Technical rept.,
by J. N. Weaver. Aug 64, 91p ML-1206
Contract Nonr225 48, Grant NSF G22929, Proj. NR373 361
Unclassified report

Supported in part by the U. S. Army Signal Corps and U. S. Air Force.

Descriptors: (*Light, Demodulation), (*Demodulators, Light), (*Semiconductor devices, Crystal mixers), (*Photoelectric cells (Semiconductor), Photoconductivity), Single crystals, Lasers, Microwave frequency, Photoelectric effect, Electrical properties, Voltage, Electric currents, Theory, Mathematical analysis, Experimental data, Design, Cadmium alloys, Selenium alloys, Silicon, Gallium alloys, Arsenic alloys.

This study is concerned with bulk semiconductors as detectors of the difference frequency between two or more optical signals and as a demodulator of microwave AM modulated light. The basic experiment consisted of mounting single crystals of CdSe, Si, and GaAs in a coaxial mount and illuminating the crystals with the beam of single laser. A dc bias voltage was applied and the microwave and dc photocurrents were measured as a function of light intensity, bias voltage, temperature, microwave match, and the various crystal samples. Some of the experimental problems encountered are discussed. An outline of the pertinent, simplified photoconductor theory is presented along with an equivalent circuit for the photodetector device. Also, the semiconductor capture cross section, lifetime, and trap density is calculated from the measured values of photocurrent. The bulk semiconductor photodetector is shown to be a rugged, simple, and inexpensive device for detecting optical beat frequencies, particularly at high light levels and in the infrared. (Author)

AD-606 220 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
TRAVELING DENSITY VARIATIONS IN PARTIALLY IONIZED GASES.
Doctoral thesis,
by Robert Shanklin Cooper. 2 Sep 64, 86p RLE-424
Contract DA36 039AMC03200E, Grant DA SIG36 039 61G14
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Plasma medium, Density), (*Glow discharges, Plasma oscillations), Gas ionization, Discharge tubes, Mechanical waves, Damping, Traveling-wave tubes.

The report deals with the problem of the propagation of macroscopic waves of ionization within the positive column

AD-606 323 Div. 25, 8
OTS Prices: HC $5.00/MF $1.25

Conductron Corp., Ann Arbor, Mich.
COHERENT LIGHT INVESTIGATION. VOLUME I,
by G. Cochran, L. Cutrona, A. Ingalls, I. Kay, and J. Newburn. Mar 64, 197p Conductron-D-5210-70-T80-110
Contract AF33 615 1014

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Light, Electromagnetic properties), (*Lasers, Radar), (*Radar, Lasers), Wave transmission, Quantum mechanics, Masers, Functions, Microwaves, Optics, Antenna radiation patterns, Electromagnetic waves, Propagation.

Contents: Fundamental considerations of electromagnetic radiation, transfer functions, the propagation of light in an inhomogeneous isotropic medium, comparison of microwave and optical radars, use of a laser in optical measurements, far field antenna pattern prediction from near field measurements, summary and future work.

AD-606 333 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
EFFECTS OF A MAGNETIC FIELD ON THE HYPERVELOCITY FLOW ABOUT A BLUNT BODY,
by Richard W. Ziemer. 27 Aug 58, 29p
STL/GM-TR-0165-00464
Contract AF04 647 165

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hypersonic flow, Magnetohydrodynamics), (*Magnetohydrodynamics, Hypersonic flow), (*Blunt bodies, Magnetohydrodynamics), Magnetic fields, Ionization, Gas flow, Shock waves, Shock tubes, Theory, Experimental data, Mathematical analysis.

An experimental investigation was made of the effect of an applied magnetic field on the bow shock of a blunt body in hypervelocity air flow. Quantitative measurements of the stand-off distance were made in a three-inch electromagnetic shock tube with free-stream velocities up to 22,000 feet per second. The test body was a hemispherical cylinder containing a coaxial pulsed magnet coil in the nose which produced field strengths at the stagnation point of up to 40 kilogauss. The application of the magnetic field displaced the bow shock upstream and the stand-off distance increased by a factor of 7.5 for the condition, nondimensional parameter = 69. The experimental results were compared with theory and good agreement was obtained within the range of experimental conditions. (Author)

AD-606 342 Div. 25, 14, 17
OTS Prices: HC $4.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SURVEY OF SPALLATION LITERATURE,
by Z. Rieder. Nov 59, 111p
Contract AF29 601 1777, Proj. 5776
AFSWC SWR TM60 3

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bibliographies, Fracture (Mechanics), (*Fracture (Mechanics), Bibliographies), Abstracts, Aging (Materials), Materials, Brittleness, Metals, Mechanical properties, Shock waves, Loading (Mechanics), Stresses, Mathematical analysis, Steel, Glass, Plastics, Impact shock, Metal plates, Crystals, Crystal lattice defects, Solids, Refractory metals, Aluminum.

This literature survey of pertinent available data on the theory and mechanism of spallation is concerned primarily with the mechanism of fracture and associated effects. The study reviews discussions of relatively long-time loadings and includes descriptions of experiments on fully brittle materials, such as glass, which were later duplicated on metals. (Author)

AD-606 344 Div. 25, 30
OTS Prices: HC $2.00/MF $0.50

Lockheed Missile and Space Co., Sunnyvale, Calif.
THERMAL STRESS ANALYSIS BY ENERGY METHODS,
by Louis A. Riedinger. Jun 58, 37p LMSC-3123-R1
PB 156 213

Unclassified report

The original paper was presented at the ARDC high speed symposium at the Univ. of Florida, Jan 57.

Descriptors: (*Thermal stresses, Mathematical analysis), Structures, Thermal expansion, Load distribution, Flat plate models, Energy, Equations.

An energy analysis is used to obtain thermal stresses in a structure subjected to temperature variation. After structural idealization--the application of redundants between the specified adjacent structural elements--the temperature of each element is applied. With the redundants missing, each element freely expands; however, the confinements generating thermal stress are calculated by use of Castigliano's minimal energy theorem and with the aid of a digital computer. Temperature stresses due to dissimilar materials are also calculated by this method. Various materials are combined in an attempt to reduce the thermal stress. In particular the alpha delta T product of the various members is studied. (Author)

AD-606 395 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
MAGNETOHYDRODYNAMIC AND PLASMA TURBULENCE,
by Leslie S. G. Kovasznay. Sep 64, 27p JHU-23-P
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Rept. on Proj. Squid. Prepared in cooperation with the Virginia Univ., Charlottesville. Paper presented at the International Congress of Applied Mechanics (no. 11), Munich, 30 Aug-5 Sep 64.

Descriptors: (*Magnetohydrodynamics, Turbulence), (*Plasma medium, Turbulence), Wake, Chemical reactions, Electrostatics, Electrical conductance, Reviews.

A review of the development in turbulence of electrically conducting media is given for the last 4-5 years. Theories of homogeneous turbulence both 'passive' and 'active' are summarized. The 'chemical' approach in hot wakes is also reviewed. The possibility of electrostatic turbulence completes the review. (Author)

AD-606 237 Div. 25, 12, 15,
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
ON THE DETERMINATION OF STRESSES AND DISPLACEMENTS FOR UNSYMMETRICAL DEFORMATION OF SHALLOW SPHERICAL SHELLS,
by Eric Reissner. 16 Sep 57, 36p GM-TR-245, EM-7-14
Contract AF18 600 1190

Unclassified report

Descriptors: (*Elastic shells, Deformation), (*Stresses, Elastic shells), Elasticity, Structural shells, Spheres, Deflection, Moments, Mathematical analysis, Boundary value problems, Differential equations, Simultaneous equations, Integration, Differential geometry.

The report is concerned with problems of bending of thin, elastic, shallow spherical shells of uniform thickness. Explicit expressions are derived, in terms of stress function and axial displacement component, for radial and circumferential displacement components. It is shown that certain uni-valued portions of the solution for stress function and axial displacement components give rise to multi-valued expressions for radial and circumferential displacement components. A new type of solution of the differential equations is derived which is multi-valued insofar as the stress function is concerned but gives uni-valued expressions for all quantities which should be uni-valued. It is shown that this type of solution is needed for the analysis of problems for which a resultant side force is acting along the edge of a symmetrical circular boundary of the shell. The nature and form of this side-force solution differs in important respects from the corresponding known solution for the case of a flat plate. No direct transition is possible from the shell solution to the corresponding flat-plate solution. As a specific application, a shell is considered which is supported at its outer edge and which has a small symmetrical rigid insert.

AD-606 249 Div. 25, 9, 20, 30
OTS Prices: HC $4.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SIMULATION AND PROTOTYPE CONSTRUCTION. PROJECT CANTALOUPE.
Final rept.,
by L. Kraus. Aug 64, 109p
Contract AF29 601 2866, Proj. 7811, Task 781102
RTD TDR63 3097

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma physics, Boundary value problems), (*Magnetohydrodynamics, Magnetic pinch), Magnetic fields, Electric fields, Surface properties, Oscillation, Ionization, Electrical conductance, Viscosity, Test equipment, Nuclear explosions, Simulation, Fluid mechanics.

A theta-pinch apparatus specifically designed for the purpose has been used to study Rayleigh-Taylor instabilities at a plasma-magnetic field interface. Special features include preionization, a pulse-shaping network, and a provision for transverse as well as axial photography. A constant magnetic field results in a constant velocity radial compression, in good agreement with 'snowplow' theory. In this case, as expected, no surface instabilities are observed. A sinusoidal compression field, however, results in instabilities whose wavelength and growth rate are measured. Theoretical dispersion relations for finite electrical conductivity and for finite viscosity are derived. In addition, the mode of maximum instability is determined. These relations are compared with the experimental results. The observed wavelength (assumed to be the wavelength of maximum instability) and its growth rate are in agreement with the assumption that the effect of viscosity must be retained in the dispersion relation. The dispersion relation in the present case is independent of the electrical conductivity. While previous investigators have attempted to correlate observed wavelengths with finite electrical conductivity, this is shown here to be unwarranted. (Author)

AD-606 290 Div. 25, 6, 12
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
SCATTERING OF ELECTROMAGNETIC WAVES FROM THE DISTURBANCE CAUSED BY A RAPIDLY MOVING BODY IN PLASMAS,
by Suc Kyuen Suh. Aug 64, 31p BrownEng-R-111
Contract DA01 021AMC85Z

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Electromagnetic waves, Scattering), (*Plasma medium, Scattering), Reentry vehicles, Wake, Atmosphere entry, Aerodynamic heating, Ionosphere, Radar echo areas, Electron density, Kinetic theory, Vector analysis, Turbulence.

The scattering of electromagnetic waves by a body moving in a plasma is discussed in detail. General theory covering scattering phenomena is developed with emphasis on a perturbation method which can be used to obtain reasonably accurate differential cross section under two different physical conditions. The general theory is extended to investigate the following two problems: the scattering of electromagnetic waves from the disturbance caused by a rapidly moving body in the ionosphere and the scattering of electromagnetic waves from the turbulent wake produced by a re-entry vehicle. In the first problem, kinetic equations are used to find the frequency spectrum of the electron density fluctuations in terms of which the differential scattering cross-section can be expressed. In the second problem the differential scattering cross-section is obtained in terms of the correlation function for turbulence, which can be estimated by using the correlation length. (Author)

AD-606 315 Div. 25
OTS Prices: HC $2.00/MF $0.50

Case Inst. of Tech., Cleveland, Ohio.
PRESSURE DERIVATIVES OF THE ELASTIC CONSTANTS OF NaCl AND KCl AT 295K AND 195K.
Technical rept. no. 8,
by Richard A. Bartels. Aug 64, 49p
Contract Nonr1141 05, Proj. NR017 309

Unclassified report

Report on Solid State Physics Program.

Descriptors: (*Sodium compounds, Chlorides), (*Potassium compounds, Chlorides), (*Crystals, Elasticity), Crystal lattices, Vibration, Ultrasonic radiation, Pressure, Temperature, Equations of state.

The pressure derivatives of the adiabatic elastic constants of NaCl and KCl were measured at 295K and 195K using the ultrasonic pulse-echo technique. The results were used to calculate mode gammas. These were found to have no strong temperature dependence. The mode gammas were suitably averaged to obtain values of Gruneisen's parameter which agree satisfactorially with those found from the Mie-Gruneisen equation of state.

AD-606 480 Div. 25, 8, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF THE PROPERTIES OF A POLYMER-SEMICONDUCTOR INTERFACE,
by G. A. Sokolina, N. A. Krotova, and Yu. A. Khrustalev. 9 Sep 64, 12p
FTD TT64 467; TT 64 71470

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1962, v. 147, no. 6, p. 1409-1412.

Descriptors: (*Polymers, Adhesion), (*Plastic coatings, Adhesion), (*Semiconductors, Plastic coatings), Germanium, Surface properties, Electrical conductance Electric fields, Electron transitions, Vinyl plastics, Acrylic resins, Chemisorption, USSR.

Investigation of the surface, polymer-semiconductor interface, by the 'field effect' method was found to have practical value for rational selection of lacquers used for covering semiconductor instruments. Experiments performed with some commercial lacquers show that their application to the surface of a semiconductor leads to considerable change in the state of the surface, changing its charge and introducing a great number of surface states. (Author)

AD-606 483 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF GROWING MONOCRYSTALS,
by G. A. Kurov, V. D. Vasil'ev, and M. G. Kosaganova. 9 Sep 64, 6p
FTD TT64 476; TT 64 71473

Unclassified report

Unedited rough draft trans. of Russian patent 152741 (appl. 750908/22, 9 Nov 61).

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Single crystals), Films, Crystals, Vaporization, Vacuum apparatus, Recrystallization.

A method is described for growing monocrystals in the form of thin films. The original material is made to vaporize in a vacuum through a sieve onto a base with subsequent recrystallization.

AD-606 506 Div. 25, 17
OTS Prices: HC $3.00/MF $0.75

South Dakota School of Mines and Technology, Rapid City.
THE THERMAL CONDUCTIVITY AND SEEBECK COEFFICIENT OF SOME CUBIC SODIUM TUNGSTEN BRONZES.
Technical rept. no. 12 (Master's thesis),
by Howard R. Shanks. 1 Sep 64, 67p
Contract Nonr2964 01, Proj. NR017 208

Unclassified report

Rept. on Solid State Physics Proj.

Descriptors: (*Bronze, Thermal conductivity), (*Thermal conductivity, Bronze), (*Thermoelectricity, Bronze), Sodium alloys, Tungsten alloys, Measurement, Differential equations, Chromium alloys, Nickel alloys, Aluminium alloys, Thermocouples, Test methods, Transition temperature, Experimental data.

The thermal conductivity and Seebeck coefficient of two cubic sodium tungsten bronze samples (NaxW03) with x-values of 0.513 and 0.804 were measured in the temperature range of 350 to 700K. The thermal conductivity measurements were made using a series comparative method with Armco iron as the standard. The Seebeck coefficients were calculated from the measured Seebeck voltages of the bronze samples with respect to Chromel and Alumel and the known Seebeck coefficients of Chromel and Alumel. The thermal conductivities of both samples were found to increase with increasing temperature with a discontinuity between 400 and 500K. The positive temperature coefficients were interpreted as a combination of electron and phonon conduction both limited by impurity scattering. The discontinuity was interpreted as a disordering of the sodium atoms.

AD-606 512 Div. 25
OTS Prices: HC $4.00/MF $1.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS.
Research rept.,
by L. B. Felsen and N. Marcuvitz. 22 May 64, 128p PIBMRI-1225-64
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 64 557

Unclassified report

Descriptors: (*Electromagnetic fields, Synthesis), (*Transmission lines, Equations), Numerical analysis, Green's function, Geometry, Optics, Propagation, Waveguides, Dielectric properties, Electromagnetic waves, Electromagnetism.

Contents: A - Approximate methods for solving the transmission line equations in variable media; radiation problems in plane stratified regions; the limit of geometrical optics.

AD-606 514 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DIAGNOSTICS OF PULSED PLASMAS AND ELECTRON BEAM-PLASMA INTERACTIONS.
Final rept. for Feb 63-Jan 64,
by Robert R. Pepper. 27 Apr 64, 23p PIBMRI-1208-64
Contract AF33 657 10820, Proj. 4156, Task 415604
AL TDR64 65

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Plasma medium, Analysis), (*Electron beams, Plasma physics), Microwave equipment, Interferometers, Electron density, Line spectrum, Plasma oscillations, Electric fields, Space charges, Gain.

A microwave phase bridge or interferometer was constructed and tested for the purpose of measuring high electron densities in pulsed plasmas. The initiation and growth, both in time and space, of a pulsed plasma (1 torr) were studied by observations of intensity and line shape of several spectral lines. Measurement of Stark splitting yielded plots of electric field intensity and hence space charge distribution as functions of axial position and time. The discharge started near the anode and propagated towards the cathode, the electric field near the cathode

AD-606 407 Div. 25
OTS Prices: HC $2.00/MF $0.50

California Univ., Riverside.
ENERGY OF ELECTRONS EXTRACTED FROM SOLIDS BY HIGH ELECTRIC FIELDS.
Final rept. for Jun 59-Sep 64,
by Allan M. Russell. Sep 64, 37p
Contract Nonr1842 02, Proj. NR017 441
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Field emission, Spectroscopy), Electrons, Electric fields, Electron optics, Silicon, Spectrum analyzers, Cathodes, Optical properties.

Research on the following aspects of field emission spectroscopy is summarized: resolution and electron optics; phase sensitive detection; field emission spectra of silicon; improved spectrometer; optical properties of field emission cathodes; preliminary measurements on photo-stimulated emission.

AD-606 421 Div. 25
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Schenectady, N. Y.
MEASUREMENT OF DAMPING.
Technical information series,
by R. Plunkett. 15 Jul 59, 25p R59GL177
Unclassified report

Prepared for presentation at the ASME Colloquim on Damping, Atlantic City, 1 Dec 59.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Damping, Measurement), Test methods, Data, Materials, Vibration, Elasticity, Energy, Stresses, Resonance, Frequency, Mathematical analysis.

AD-606 457 Div. 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COMPLETE SOLUTION FOR AN ELASTIC HALF-SPACE UNDER A POINT STEP LOAD,
by H. A. Lang. 23 Oct 57, 34p P-1141
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Mechanical waves, Loading (Mechanics)), (*Surface properties, Mechanical waves), (*Elasticity, Theory), Stresses, Boundary value problems, Mathematical analysis, Equations, Mechanics, Strain (Mechanics), Integrals.

The problem of the dynamic response of an elastic half-space to a unit step load is continued by extending the method developed by the author in a previous paper to include the phenomena of total reflection and Rayleigh surface waves. Confirmation of the method is provided by developing the displacement potentials everywhere in the half-space and showing that, for Poisson's ratio = 1/4, the surface displacements agree identically with the equations of Pekeris. The boundary condition of vanishing surface stress is also verified. The potentials and displacements, expressed in integral form, represent the complete solution of the problem. (Author)

AD-606 470 Div. 25, 4, 14, 17
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENT OF THERMODYNAMIC PROPERTIES OF COMPOUNDS OF ELEMENTS IN GROUPS II, IV V AND VI.
Final rept.,
by Michael B. Bever, Brian W. Howlett, Somnath Misra, Peter M. Robinson, and Peter Beardmore. 14 Jul 64, 44p
Contract AF19 604 5588, Proj. 5620, Task 562001
AFCRL 64 623
Unclassified report

Descriptors: (*Intermetallic compounds, Thermodynamics), (*Solid solutions, Thermodynamics), Heat of formation, Crystal substructure, Heat of solution, Heat of fusion, Melting, Specific heat, Antimony compounds, Bismuth compounds, Magnesium compounds, Indium compounds, Selenides, Tellurides, Germanium alloys, Tin alloys, Lead alloys, Thermochemistry, Chemical bonds, Phase studies, X-ray diffraction analysis, Hardness.

The research was concerned with the measurement and interpretation of thermodynamic properties of certain compounds and solid solutions. The following measurements were made. Heat of formation: Sb_2Se_3, Sb_2Te_3, Bi_2Se_3, Bi_2Te_3, Mg_2Ge, Mg_2Sn, Mg_2Pb, In_2Te, InTe, In_2Te_3, In_2Te_5; solid solutions in the systems Bi_2Te_3-Bi_2Se_3, Sb_2Te_3-Bi_2Te_3, and Sb-Bi. Energies of order-disorder: certain compositions in the systems Bi_2Te_3-Bi_2Se_3 and Sb_2Te_3-Bi_2Te_3. Heats of solution: Mg, Ge and Pb in Sn; Sb, Se, and Te in Bi. Heats of fusion and melting points: Sb_2Te_3, Bi_2Te_3, Mg_2Sn, Mg_2Pb, InTe, In_2Te_3. Heat capacities near the melting points: Sb_2Te_3, Bi_2Te_3. The thermodynamic properties were interpreted in relation to the bonding of the compounds and the solid solutions and to the nature of the relevant phase transitions. (Author)

AD-606 479 Div. 25, 1, 12
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Long Beach, Calif.
A STUDY OF THE THERMAL CONDUCTANCE OF METALLIC JOINTS.
Technical note,
by G. W. Gurry and H. S. Cote. 23 Jan 58, 23p
LB-25705
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Thermal conductivity, Metal joints), (*Metal joints, Thermal conductivity), Structural parts, Aerodynamic heating, Aircraft, Guided missiles, Surface properties, Panels (Structural), Beams (Structural), Structures, Stresses, Riveted joints, Aluminum alloys, Stainless steel, Pressure.

This report presents the results of a study of the thermal conductance of structural joints utilized in aircraft and missiles. The purpose of the study was to determine the range of values for the thermal conductance of typical aircraft and missile structural joints as well as some of the more important factors which influence these values. It is concluded that the conductances may range from 150 to 1300 BTU/HR sq. ft. degrees F for typical skin-rib structure which is exposed to moderate aerodynamic heating. A more precise prediction of the conductance necessitates an experimental program. In addition, the effects of interface pressure and mating surface roughness were established as the most important factors contributing to the joint conductance. (Author)

Rept. for 13 May 63-30 Apr 64,
by John Vieira and W. F. Riley. Aug 64, 59p
Contract AF29 601 5362, Projs. 1080, 5710,
Task 108012
WL TDR64 65

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structural shells, Photoelasticity), (*Photoelasticity, Structural shells), Cylindrical bodies, Stresses, Thickness, Load distribution, Mathematical analysis, Polariscopes, Optical analysis, Hydrostatic pressure, Heat treatment.

A study was conducted to determine stress distributions in several types of thick-walled cylindrical shells. The stresses were determined by using both the embedded-polariscope and stress-freezing methods for three-dimensional photoelasticity. The study indicates that an approximate analytical solution for stresses in thick-walled cylinders with hemispherical heads is sufficiently accurate for structural design applications. Simple curved beam theory is also shown to give reasonable stress values for certain structures which take the form of a thick-walled half cylinder. Finally the study indicates that embedded polaroid elements perform satisfactorily under complex states of stress; therefore, the embedded-polariscope method represents a completely feasible approach for transient three-dimensional stress determinations. (Author)

AD-606 609 Div. 25, 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING, WAVE PROPAGATION AND THE WKB APPROXIMATION,
by Richard Bellman and Robert Kalaba.
26 Dec 57, 8p P-1239

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Electromagnetic wave reflections, Numerical analysis), (*Invariance, Propagation), Refraction, Differential equations, Series, Matrix algebra, Wave transmission.

In previous papers, some applications of the principle of invariant imbedding to radiative transfer and neutron diffusion processes were presented. This use of invariance principles was stimulated by the fundamental work of Ambarzumian and Chandrasekhar, and strongly influenced by the point of regeneration technique of Bellman and Harris, and the theory of dynamic programming. Fundamental for the success of these techniques as applied to the above processes is the ability to consider the overall physical process as a sequence of local processes. For the case of particles, this is easily done. This paper indicates how wave propagation may be considered in these terms. It is rather remarkable that the results are based upon an algorithm that, in general, can yield divergent series. Following a provocative paper by Bremmer, the aim is to show that wave propagation can be discussed in terms of reflection and refraction at infinitesimally separated interfaces. It was proven that the convergence of the Bremmer series can be established under a simple assumption concerning the slowly varying nature of the local wave number.

AD-606 636 Div. 25, 26
OTS Prices: HC $2.00/MF $0.50

Optics Technology, Inc., Belmont, Calif.
FIBER OPTICS IMAGE DEVICE.
Final rept. for Apr 62-Jul 63,
by D. F. Capellaro. Aug 64, 35p
Contract AF30 602 2746, Proj. 5578, Task 557803
RADC TDR64 217

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fiber optics, Images), Optical equipment, Manufacturing methods, Fibers, Bonding, Machines, Design, Feasibility studies, Display systems.

The development of a fiber optics image device using the 'cylindrical fibers redistribution system' is discussed. The program included the investigation of various fabrication techniques and the construction of equipment for the suitable manipulation of fiber layers to form an image device. Three fabrication techniques, (1) rotating substrate, (2) expanding substrate, and (3) expanding-contracting, were investigated. A machine was designed and constructed for the production of fiber layers which would be close packed at one end and spaced by 12 times the diameters of the fibers at the other end. The basic feasibility of a fiber optics image enlargement device and the machinery required for its fabrication was fairly well proven in the program. (Author)

AD-606 640 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Centre National dé la Recherche Scientifique, Paris (France).
HIGH VACUUM ULTRAVIOLET EFFECTS.
Technical documentary rept. for 1 Apr 63-31 Mar 64,
by B. Vodar. Aug 64, 14p
Contract AF61 052 679, Proj. 7367, Task 736704
ML TDR64 259

Unclassified report

Descriptors: (*Ultraviolet spectroscopy, Vacuum), (*Phototubes, Vacuum apparatus), Sparks, Electric discharges, Plasma physics, Photocathodes, Photons, Uranium, Tungsten, Anodes, Ultraviolet radiation.

Optimum electrical parameters have been determined for use with the three-electrode vacuum spark to obtain proper operation. The discharge viewed 'side-on', with the anode perpendicular to the optical axis, does not yield quite as reproducible results as the discharge viewed 'end-on', where the anode lies on the optical axis and just the diameter of the anode is seen. The photon output is larger with the latter arrangement. Both uranium and tungsten anodes have been used and light output measurements show little difference between the two anode materials except below 15 KW. (Author)

AD-606 645 Div. 25, 15
OTS Prices: HC $3.00/MF $0.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
CHARACTERISTIC VALUES FROM A NEW APPROACH TO PHASE INTEGRAL APPROXIMATION.
Scientific rept.,
by K. M. Hagenbuch. 10 Sep 64, 54p IRL-219
Contract AF19 628 4014, Proj. 8605, Task 860502
AFCRL 64 638

Unclassified report

Descriptors: Quantum mechanics, Integrals), (*Atomic orbitals, Quantum mechanics), Field theory, Scattering, Nonlinear differential equations, Transformations (Mathematics), Functions, Harmonic oscillators, Taylor's series.

reached 45 Kv/ cm in 25 nanoseconds and remained at about 58 Kv/ cm during almost the total pulse duration of 500 nanoseconds. The total optical radiation after 24 nanoseconds is only 5 percent of its value after 500 nanoseconds. A set-up was constructed for studying interactions between an electron beam and a plasma. The plasma was produced by electron impact in the beam when the gas pressure was between 0.0001 and 0.01 torr. Some electronic gain was observed but no quantitative results were obtained because of experimental difficulties in maintaining a strong beam and an appropriate plasma. (Author)

AD-606 519 Div. 25
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THE STABILITY UNDER AXIAL COMPRESSION AND LATERAL PRESSURE OF A CIRCULAR-CYLINDRICAL SHELL WITH AN ELASTIC CORE,
by Paul Seide. 1 Mar 60, 28p STL/TR-60-0000-09032, STL/EM-10-1
Unclassified report

Descriptors: (*Cylindrical bodies, Structural sheets), (*Structural shells, Stability), (*Loading (Mechanics), Structural shells), Compressive properties, Pressure, Structures, Mathematical analysis, Stresses, Buckling (Mechanics), Elasticity.

The stability under axial compression and lateral pressure of a finite circular-cylindrical shell with an elastic core is treated by means of Donnell's equations. For lateral pressure it is found that a previous solution treating the cylinder as a ring or a long cylinder is adequate for a wide range of combinations of length-radius ratio, radius-thickness ratio, and ratio of moduli of core and cylinder. Results for axial compression are included for completeness and to correct a previous analysis of the same problem. (Author)

AD-606 534 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE MASER: A NEW TYPE MOLECULAR AMPLIFIER FOR MICROWAVE RADIATION,
by W. H. Culver. Rev. 18 Oct 57, 22p P-1171
Unclassified report

Prepared for the October 25, 1957 issue of Science. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Masers, Operation), Microwave spectroscopy, Microwave amplifiers, Design, Molecular beams, Gain, Noise (Radio), Magnetic fields, Energy, Crystals, Theory.

The principle of operation of the maser is presented. A number of masers which have been built or proposed are investigated. These include the molecular beam maser, the negative temperature maser, the optically pumped maser, and the solid state maser.

AD-606 536 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AXISYMMETRIC WAVE FIELDS.
Progress rept.,
by H. A. Lang. 20 Aug 57, 16p P-1173
Unclassified report

Presented at the Impact Symposium (2nd), Washington, D.C., 22-24 May 57, sponsored by ARDC and NRL.

Descriptors: (*Mechanical waves, Propagation), (*Propagation, Mechanical waves), Boundary value problems, Elasticity, Loading (Mechanics), Axisymmetric bodies, Dynamics, Functions, Stresses.

A new method for the solution of wave propagation problems is applied to axisymmetric wave fields.

AD-606 559 Div. 25
OTS Prices: HC $2.00/MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
TRANSIENT REFLECTION AND TRANSMISSION OF A PLANE WAVE NORMALLY INCIDENT UPON A SEMI-INFINITE ANISOTROPIC PLASMA,
by Carl T. Case. Jul 64, 44p
Proj. 4642, Task 4642
AFCRL 64 550; AFCRL PSRP33
Unclassified report

Descriptors: (*Plasma physics, Wave transmission), (*Wave transmission, Plasma physics), (*Magnetohydrodynamics, Wave transmission), Electromagnetic wave reflections, Electrons, Motion, Partial differential equations, Integral transforms, Electromagnetism, Theory.

General solutions for the transmitted and reflected waves in integral form are obtained for a plane wave of arbitrary time dependence, normally incident upon a semi-infinite, cold, collisionless, homogeneous, anisotropic ionized medium. The special case of an isotropic plasma with an incident wave of harmonic time dependence is also investigated. (Author)

AD-606 562 Div. 25
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
THE STABILITY UNDER AXIAL COMPRESSION AND LATERAL PRESSURE OF CIRCULAR-CYLINDRICAL SHELLS WITH A SOFT ELASTIC CORE.
Expanded edition,
by Paul Seide. Jan 61, 57p
STL/EM-11-3, STL/TR-61-0000-19015
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structrial shells, Compressive properties), (*Cylindrical bodies, Structrial shells), Stability, Elasticity, Pressure, Loading (Mechanics), Stresses, Buckling (Mechanics).

The stability under axial compression and lateral pressure of a finite circular-cylindrical shell with an elastic core is treated by means of Donnell's equations. The stability criterion is investigated in detail for the general cylinder under axial compression or lateral pressure and for a particular cylinder under combined loading. Comparisons are made with available experimental data. (Author)

AD-606 571 Div. 25
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
THREE-DIMENSIONAL PHOTOELASTICITY STUDY OF THICK-WALLED CYLINDRICAL SHELLS.

(*Plasma medium, Fluid flow), Electrical properties, Magnetic fields, Effectiveness, Enthalpy, Energy conversion, USSR.

Using a one-dimensional formulation of the problem, an analysis is conducted of conditions of flow in the duct of a magnetohydrodynamic (MHD) generator during condition of constancy of speed which takes into account factors influencing change of electrical efficiency and induction of magnetic field on its length. Special attention is given to selection of parameters by which it is expedient to compare various types of generators, and by analysis of influence of conditions of operation of MHD-generator on its internal efficiency. It is shown that the internal efficiency of a generator is determined by value of local electrical efficiency, and consequently, for a MHD-installation the kind of electric efficiency at which the generator operates is important. (Author)

AD-606 757 Div. 25, 15
OTS Prices: None/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN MATHEMATICAL METHODS OF SOLVING ENGINEERING PROBLEMS,
by I. A. Birger. 6 Apr 64, 180p
FTD MT63 190; TT 64 71502

Unclassified report

Edited machine trans of Nekotorye Matematicheskie Metody Resheniya Inzhenernykh Zadach, Moscow, 1956, 151p.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.
Document is available in microfiche only.

Descriptors: (*Engineering, Mathematics), (*Mechanics, Structures), (*Functions, Differential equations), (*Integral equations, Boundary value problems), Elasticity, Stability, Vibration, Strength, Rods, Structural shells, USSR.

In this report there is given an application of normal fundamental functions and integral equations for solving engineering problems. Examples considered refer to problems of strength, stability and vibrations of elastic systems, however, the results can be used also in other fields of engineering.

AD-606 759 Div. 25
OTS Prices: HC $3.00/MF $0.75

Metals Research Lab., Brown Univ., Providence, R. I.
ULTRASONIC METHODS IN THE STUDY OF DEFORMATION IN SINGLE CRYSTALS.
Rept. for 1 Jan-31 Dec 63,
by Bruce Chick, Akira Hikata, George Anderson, Charles Elbaum, and Rohn Truell. Mar 64, 68p
Contracts AF33 657 8324, Continuation of AF33 616 6945, Proj. 7360, Task 736002
ML TDR64 34

Unclassified report

Descriptors: (*Single crystals, Deformation), (*Crystal lattice defects, Vibration), (*Aluminum, Crystal lattice defects), Ultrasonic radiation, Attenuation, Mechanical waves, Propagation, Stresses, Crystal structure, Plasticity, Lithium compounds, Fluorides, Sodium compounds, Chlorides, Recording systems.

The purpose of the investigation was that of understanding the physical changes which occur in aluminum and in certain ionic crystals during and after deformation. The investigation involved the study of imperfection behavior generally, and specifically the interaction of point defects with moving and vibrating dislocations, as well as the contribution of dislocations to the anharmonic characteristics of solids. (Author)

AD-606 761 Div. 25, 2, 13
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF CONDITIONS OF SERVICE OF UNDERGROUND PIPE LINES DURING EARTHQUAKES,
by T. Rashidov. 26 Dec 63, 18p
FTD MT63 130; TT 64 71496

Unclassified report

Edited machine trans. of Akademiya Nauk Uzbekskoi SSR, Tashkent. Izvestiya. Seriya Tekhnicheskikh Nauk, 1962, no. 5, p. 44-52.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Earthquakes, Underground structures), (*Underground structures, Pipes), (*Pipes, Earthquakes), Earthquake-resistant structures, Dynamics, Statics, Deformation, Stresses, Seismic waves, Seismology, Creep, Steel, Elasticity, Equations.

From the static theory of the earthquake resistance of constructions, it is assumed that a pipe line and the ground surrounding it are deformed identically. The relative dislocations are not considered. Formulas were obtained for determining stresses on a pipe line during the propagation of longitudinal seismic wave in a direction along the axis of the pipe line. The creep of particles of ground from the pipe line were considered by means of a certain coefficient, which for an evaluation of the magnitude of stresses is assumed to be equal to unity. The creeping of a pipe line from particles of ground was considered depending upon volume of ground, participating in the joint movement of the cited medium ground-pipe line. On the basis of several examples a conclusion was reached about large reserve in strength of ordinary steel pipe lines during earthquakes of average and high intensities. In this work on the basis of dynamic theory of earthquake resistance of a hydroelastic system a dynamic theory of earthquake resistancy of underground pipe lines is proposed.

AD-606 778 Div. 25
OTS Prices: HC $3.00/MF $0.75

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE DOUBLE REFRACTION TEMPORARILY PRODUCED IN ISOTROPIC BODIES, AND ON THE RELATIONSHIP BETWEEN MECHANICAL- AND PHOTOELASTICITY,
by M. G. Wertheim. 18 Sep 64, 62p
RSIC 270; TT 64 71482

Unclassified report

Trans. of Annales de Chimie et de Physique (France) 1854, ser. 3, v. 40, p. 156-221.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Refraction, Theory), (*Elasticity, Theory), (*Photoelasticity, Theory), Optical phenomena, Loading (Mechanics), France.

AD-606 779 Div. 25, 27
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
RESULTS OF EXPERIMENTAL INVESTIGATION OF CONTACT HEAT EXCHANGE BETWEEN FLAT METAL SURFACES,
by V. S. Miller. 21 Sep 64, 22p
RSIC 272; TT 64 71483

Unclassified report

The wave equation and a square integrability condition on allowable solutions, both transformed to a first order nonlinear system, are used to produce phase integral approximations to quantization conditions for bound state quantum mechanical problems. (Author)

AD-606 649 Div. 25
OTS Prices: HC $2.00/MF $0.50

Paris Univ. (France).
STUDY OF A PLASMA OF ARGON AND ARGON-HYDROGEN MIXTURE.
Technical note no. 2,
by A. Constantin, J. Godart, J. J. Hamm, and R. Rioux.
Jun 64, 26p
Contract AF61 052 727
AFCRL 64 745

Unclassified report

Descriptors: (*Argon, Plasma medium), (*Hydrogen, Plasma medium), (*Plasma medium, Argon), Transport properties, Plasma physics, Differential equations, Statistical functions, Conductivity.

In this report the relative importances of elastic, inelastic, e-i and e-e collisions are investigated for plasmas of Argon and Argon-Hydrogen mixture. A differential equation neglecting propagation effect, is given, allowing to calculate the conductivity of a plasma when the isotropic part of the distribution function is known. The computation of stationary conductivity of an Argon plasma with small amounts of molecular hydrogen is made for a Maxwellian distribution function. (Author)

AD-606 656 Div. 25, 14
OTS Prices: HC $3.00/MF $0.50

Hebrew Univ., Jerusalem (Israel).
RESEARCH ON OPTICS OF SELECTIVE SURFACES.
Final rept. for 1 Sep 59-31 May 63,
by H. Tabor. 12 May 59, 56p
Contract AF61 052 279
AFCRL 64 351

Unclassified report

A portion of the original document contains fine detail which may make reading photocopy difficult.

Descriptors: (*Solar radiation, Absorption), (*Optical filters, Surface properties), (*Nickel compounds, Peroxides), Optical phenomena, Thermal radiation, Mathematical models, Electrodeposition, Microstructure, Chromium compounds, Dioxides, Israel, Coatings.

Selective surfaces for solar energy absorbers comprise a metal base, of low intrinsic thermal emissivity modified - usually by the addition of surface coatings to obtain a high absorptivity to solar radiation with as little increase as possible to the emissivity. This combination constitutes a reflection filter. The programme concerned itself primarily with nickel-black coatings produced by electro-deposition. It was shown that the chemical and optical properties of these coatings varies with thickness and with the conditions in the placing bath. New optical and mathematical techniques were developed to determine the optical constants of thin absorbing layers (which are not necessarily isotropic in depth) and how to manipulate them to produce filters with desired characteristics. Early selective surfaces of this kind used a pair of different nickel-black layers on a metal base and passable filter properties were obtained. Development of the theory of these surfaces suggested the addition of an intermediate layer (metallic) to produce a three-layer system with a very broad interference region in the solar spectrum. Some work was started on other 'blacks' such as chromium-black. (Author)

AD-606 682 Div. 25
OTS Prices: HC $1.00/MF $0.50

University Coll., London (England).
AUGER RECOMBINATION INTO TRAPS.
Scientific rept. no. 3,
by P. T. Landsberg, C. Rhys-Roberts, and P. Lal.
1 Jul 64, 12p
Contract AF61 052 664
AFCRL 64 747

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solid state physics, Theory), Semiconductor devices, Thermal conductivity, Mathematical analysis, Brillouin zones, Electrons, Low temperature research.

AD-606 700 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Ionosphere Research Lab., Pennsylvania State Univ., University Park,
ELECTROMAGNETIC WAVE REFLECTION FROM AN OSCILLATING, COLLISION-FREE MAGNETO-IONIC MEDIUM.
Scientific rept.
by O. E. H. Rydbeck. 20 Jun 64, 68p IRL-211
Contract AF19 628 4014; Grant NSF G18983,
Proj. 8605, Task 860502
AFCRL 64 610

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electromagnetic wave reflections, Magnetic fields), (*Magnetic fields, Electromagnetic wave reflections), Electrons, Electromagnetic waves, Propagation, Space charges, Velocity, Resonance, Ionization, Mathematical analysis, Magnetohydrodynamics, Theory.

A collision free or low collision magneto-ionic medium is easily perturbed by a driving or pumping wave, even of moderate power. Unless the pump wave is of the longitudinal mode it will generate longitudinal electron velocities as well as differential space charge densities. These quantities, as well as the transverse, pump field electron velocities, will affect the propagation of any (low power) signal or probing wave propagating through the medium, which now has oscillating and travelling electron velocity and electron density ripples.

AD-606 741 Div. 25, 7, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FLOW OF ELECTRO-CONDUCTIVE GAS WITH CONSTANT SPEED IN THE DUCT OF A MAGNETOHYDRODYNAMIC GENERATOR,
by A. V. Gubarev, V. I. Kovgasyuk, S. A. Medin, A. E. Sheindlin, and B. Ya. Shumyatskii. 18 May 64, 14p
FTD MT64 22, TT 64 71488

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 3, p. 3-8.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Generators),

ON THE STRESSES IN A NONLINEAR BEAM SUBJECT TO RANDOM EXCITATION,
by Richard E. Herbert. Aug 64, 24p
Grant AF AFOSR62 313, Proj. 9782, Task 37718
AFOSR 64 1038

Unclassified report

Descriptors: (*Beams (Structural), Stresses), (*Stochastic processes, Beams (Structural)), Nonlinear systems, Elasticity, Numerical analysis, Membranes, Loading (Mechanics), Deflection, Deformation.

The method of equivalent linearization is used to investigate the effects of the membrane force on the stresses in a simply supported Bernoulli-Euler beam subject to random excitation. It is shown that, while the mean-square membrane stress is negligible compared to the mean-square bending stress, the former nevertheless has the effect of reducing the latter. Furthermore, this reduction is less significant for higher driving frequencies, thereby reducing any 'nonlinear safety factor' that might be considered. (Author)

AD-606 826 Div. 25, 21
OTS Prices: HC $3.00/MF $0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.
Quarterly progress rept. no. 5, 15 May-15 Sep 64,
by Richard E. Balzhiser, Robert E. Barry, Bruce F. Caswell, Herman Merte, Jr., and Andrew Padilla, Jr. Sep 64,
64p ORA-05750-16-P
Contract AF33 657 11548, Proj. 05750

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 074.

Descriptors: (*Heat exchangers, Liquid metal coolants), (*Liquid metal coolants, Heat transfer), Film boiling, Rubidium, Sodium, Zirconium, Liquid metal pumps, Nucleate boiling, Transition temperature, Weightlessness.

A numerical analysis of the edge effects in the 1 in. diameter film boiling apparatus was completed. The uncertainty in condensing coefficients for sodium beneath the plate makes it difficult to correct for the large amount of heat which flows up the wall when the system operates in the film regime. A design for a modified boiler is presented. The forced convection apparatus was reassembled after the zirconium chips in the hot trap were replaced. Filters were added at several points in the system to collect suspended solids or oxide if either existed in the system. Despite all efforts plugs still developed and flow was obtained for only brief periods during this time. The extremely small pumping restriction seems to accentuate the problem and consideration is being given to purchasing a new pump which might permit circulation for a period sufficiently long to collect all solids in the loop filters. The agravic apparatus was operated with mercury at a/g of one. Data was obtained in the nucleate, transition and film regimes. (Author)

AD-606 829 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Naples Univ. (Italy).
PROPAGATION OF ELECTROMAGNETIC WAVES IN AN INHOMOGENEOUS MEDIUM.
Final technical rept.,
by L. G. Napolitano. Feb 64, 48p IA-115
Contract AF61 052 548
AFCRL 64 758

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Theory), (*Wave transmission, Plasma physics), (*Plasma physics, Gas ionization), (*Thermodynamics, Gas ionization), Electromagnetic fields, Thermodynamics, Dynamics, Polarization, Entropy, Enthalpy, Ionization, Mathematical models, Equations, Propagation, Motion.

This report consists of two parts dealing with; the thermodynamics and dynamics of ionized gasses; and, the influence of finite ionization rates on the wave propagation through ionized gasses. In the first part a non-relativistic phenomenological theory satisfying the Lorentzian invariance of thermodynamic quantities and not based on any a-priori assumption for the form of the electromagnetic momentum density is developed of an arbitrary polarizable medium. In the second part the subject topic is dealt with by using both the one-fluid model and the Lenhert two-fluid model for the plasma.

AD-606 837 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Battelle Memorial Inst., Geneva (Switzerland).
INVESTIGATION OF ABSORPTION AND RE-EMISSION OF OXIDE CRYSTALS CONTAINING DISSIMILAR FOREIGN IONS.
Technical rept.,
by W. Schneider. 20 Aug 64, 44p
Contract AF61 052 696
AFCRL 64 797

Unclassified report

Descriptors: (*Lasers, Materials), (*Corundum, Spectroscopy), Single crystals, Impurities, Vanadium, Chromium, Absorption spectroscopy, Emissivity, Fluorescence, Nuclear paramagnetic resonance, Optical properties, Aluminum compounds, Oxides, Switzerland.

Absorption spectra, as well as activation and fluorescence spectra, of corundum single crystals doped with chromium alone, vanadium alone, and chromium plus vanadium, are presented. The fluorescence of Benitoite at room temperature and at - 190C was measured; the results are also contained and discussed in the report. (Author)

AD-606 848 Div. 25, 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
METEOROLOGICAL ASPECTS OF INFRARED OPERATIONS,
by J. Doyne Sartor. 3 Mar 58, 18p P-1299

Unclassified report

Presented at the 28th meeting of the Western Section of IRIS, 5 Mar 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Meteorological parameters, Infrared research), (*Infrared research, Meteorological parameters), Infrared radiation, Wave transmission, Clouds, Correlation techniques, Optics.

Three types of meteorological information are useful for infrared studies. The first type consists of average or usual conditions which can be applied most of the time. The second and third types are concerned directly with larger variations in time and space. They are distinguished by the length of time period between a request for information and its planned application. If the period falls within about 72 hours of the time of the request, a

Trans. of Akademiya Nauk URSR, Kiev. Instytut Teploenergetyky. Zbirnyk Prats', 1960, no. 20, p. 44-53.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Heat transfer, Surfaces), Metal, Thermodynamics, USSR, Gas turbines.

The design of economical gas turbine apparatus with high parameters for the operating body is associated with a comprehensive solution of the complicated problems of heat exchange in the components of turbine engines. The study of contact heat exchange between metal surfaces makes it possible to determine boundary conditions required for the calculation of the temperature fields of turbine parts. In building power engines we often use designs of individual connections in which two or more parts come into contact directly with each other through which there is a heat flow. Contact heat exchange surfaces are encountered in heat exchange apparatus of the chemical and metallurgical industry, in the making of instruments, in building reactors, etc. (Author)

AD-606 795 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
TRANSIENT RESPONSE OF GRADED-BASE TRANSISTORS,
by George L. Salton. Aug 64, 38p
RADC TDR64 295
Unclassified report

Descriptors: (*Transistors, Transients), (*Transients, Transistors), Semiconductor devices, Mathematical analysis, Boundary value problems, Diffusion, Impurities.

Basic transient properties of graded-base transistor have been examined in terms of the minority-carrier distribution in the base region, subject to the restricting conditions of a one-dimensional device geometry and low injection. The mathematical expressions for the minority-carrier distributions in the base region and for the transient times have been found. The method used was to apply various boundary conditions to the one-dimensional diffusion equation which was solved by the 'separation of variables' technique. In order to satisfy the initial conditions of individual solutions, the general solutions of the transient times are formulated in terms of infinite series. Approximate, closed form solutions for the transient times are obtained by neglecting the higher order terms of the series. The closed-form expressions for the transient times offer good approximations for small values of f and reduce to the expressions obtained for homogeneous-base transistors when f is allowed to go to zero. (Author)

AD-606 797 Div. 25, 4, 14
OTS Prices: HC $6.00/MF $1.25

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
LOW TEMPERATURE VAPOR GROWTH STUDIES.
Scientific rept. no. 3,
by A. Reisman. 30 Jun 64, 206p
Contract AF19 628 2468, Proj. 4608, Task 460805
AFCRL 64 686
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-433 640.

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Vapors), Germanium, Gallium alloys, Arsenic alloys, Polishes, Sodium compounds, Hypochlorites, Etched crystals, Hydrogen compounds, Hypochlorites, Etched crystals, Hydrogen compounds, Iodides, Silicon, Iodine, Helium, Hydrogen, Chlorine, Transport properties, Epitaxial growth, Chemical equilibrium, Photochemistry, Absorption spectrum, Germanium compounds, Silicon compounds, Chlorides, Reduction (Chemistry).

Topics include: room temperature polishing of Ge and GaAs using NaOCl solutions; high temperature etching of Ge with HI; growth rate in the Ge-I2-He-H2 vapor transport system; exitaxial Ge growth in the Ge-C12-H2 system; Bourdon gauge measurements on the GeCl2 system; photochemical etching of Ge and Si with Cl2; optical absorption in several open tube systems; transpiration in the Ga-HI-H2 and Ge-HI-H2 systems; growth of Si single crystals by the H2 reduction of SiCl4.

AD-606 799 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROPAGATION OF THERMAL STRESS IN AN ELASTIC-PLASTIC ROD,
by Yu. P. Suvorov. 29 Jan 64, 16p
FTD MT63 225; TT 64 71505
Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1963, v. 27, no. 2, p. 383-389.
Limited supply on hand: when exhausted, document will be available in microfiche only.

Descriptors: (*Thermal stresses, Propagation), Rods, Heating, Elasticity, Plasticity, Stresses, Thermal conductivity, Nonlinear differential equations, USSR.

The problem is solved concerning the propagation of stress waves in a semi-infinite elastic plastic rod due to sudden heating of the free end; consideration is given to the dependence of the coefficient of thermal conductivity on the temperature (i.e. the nonlinear equation of thermal conduction is investigated) which involves the finiteness of the speed of propagation of heat in the rod. Calculation of this leads to quantitative features of the elastic solution as compared with known earlier solutions. It is assumed that the material of the rod is incompressible and possesses linear hardening; mechanical properties are considered to be independent of temperature. (Author)

AD-606 805 Div. 25
OTS Prices: HC $2.00/MF $0.50

Maryland Univ., College Park.
THE ZERO-POINT ENERGY OF AN ELECTRON LATTICE,
by Alexei A. Maradudin and Rosemary A. Coldwell-Horsfall.
May 60, 38p MUP TR177
AFOSR TN60 446
Unclassified report

Prepared in cooperation with Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Crystal lattices, Electrons), Chemical bonds, Atomic orbitals, Melting, Stability, Statistical functions, Vector analysis.

AD-606 810 Div. 25, 1
OTS Prices: HC $1.00/MF $0.50

Florida Univ., Gainesville. Engineering Experiment Station.

26. Production and Management

AD-606 194 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BRIEF REVIEW OF INVENTORY THEORY,
by Murray A. Geisler. Jan 62, 12p P-2517
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Inventory, Mathematical analysis), (*Optimization, Inventory), Mathematical models, Inventory analysis, Management engineering, Costs, Probability, Dynamic programming, Statistical analysis.

This paper describes the current status of inventory theory by summarizing the main results that have been obtained in the subject, particularly in the last few years. Deterministic inventory models and probabilistic models are considered, we shall also distinguish and distinctions are made between the one-period and the N-period models. The implications of the result for the user of inventory theory are stressed.

AD-606 234 Div. 26, 7
OTS Prices: HC $1.00/MF $0.50

Assembly Products, Inc., Chesterland, Ohio.
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
Quarterly progress rept. no. 5, 1 May-31 Jul 64,
by R. H. Nichols. 31 Jul 64, 10p
Contract DA36 039AMC01473E
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Measuring devices (Electrical and Electronic), Manufacturing methods), Voltmeters, Ammeters, Test equipment, Performance (Engineering), Machines, Tests.

Testing of seven 'state-of-the-art' samples in accordance with combinations of the specified requirements gave generally good results. Selection of the best grade of iron for the working vanes has been started using samples of different alloys. Several manufacturing variables which affect meter performance were studied. A new anvil plate has been installed on the shock testing machine in an attempt to resolve difficulties in producing specified test conditions. Tooling has been completed for the window sealing gaskets for 2 1/2 and 3 1/2 inch meters. Tooling has been started for dial plates, scale printing, 2 1/2 inch window, cases, and the mechanism top bracket stamping. (Author)

AD-606 261 Div. 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONTINUOUS PRODUCTION AND EMERGENT DEMAND,
by T. A. Goldman. 9 Jul 57, 13p P-1010
Unclassified report

Descriptors: (*Spare parts, Costs), (*Industrial production, Spare parts), Probability, Models (Simulations), Scheduling, Inventory, Replacement theory, Management planning.

A model of the real and monetary costs involved in supplying spare parts from current production is presented. The model leads to a cost function for each part individually depending on its production characteristics and its demand probability function, and on certain policy variables. By choosing appropriate values for the policy variables, the cost function for each part can be minimized independently of the others.

AD-606 284 Div. 26
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRODES AND FLUXES FOR ARC WELDING,
by N. B. Fishbein. 23 May 63, 70p
FTD TT62 1522; TT 63 23617
Unclassified report

Elektrody i Flyusy dlya Dugovoi Svarki, unedited rough draft trans. of Nauchno-Populyarnaya Biblioteka Rabochego-Svarshchika (USSR) 1961, v. 9, 62p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Welding rods, Welding), (*Welding fluxes, Welding), Welds, Production, Steel, Alloys, Metals, Coatings.

This publication recounts the history of the development of electrodes and fluxes, describes the influence of electrodes and fluxes on the quality of welded joints, and gives examples of the mechanization of electrode production. (Author)

AD-606 291 Div. 26, 17
OTS Prices: HC $3.00/MF $0.75

Fansteel Metallurgical Corp., North Chicago, Ill.
COLUMBIUM ALLOY SHEET ROLLING PROGRAM.
Final rept. for 7 Mar 63-1 Sep 64,
by H. L. Kohn and R. M. Curcio. Oct 64, 72p
Contract NOw63 0231c
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Niobium alloys, Rolling (Metallurgy)), (*Rolling (Metallurgy), Niobium alloys), Sheets, Tantalum alloys, Tungsten alloys, Zirconium alloys, Vanadium alloys, Molybdenum alloys, Creep, Rupture, Transition temperature, Welding, Chemical analysis, Mechanical properties.

Six inch diameter, 300 lb. ingots of FS-85 (Cb-27Ta-10W-1Zr) and B-66 (Cb-5V-5Mo-1Zr) were processed to produce 0.060 in x 18 in wide sheet. The FS-85 was successfully converted to target dimensions while the B-66 sheets did not meet the 18 in width criteria. The finished sheet was evaluated with respect to chemical and mechanical properties and weldability. The ingot to sheet yield for FS-85 was 51.1% while the yield for B-66 was only 21.5%. FS-85 was considerably easier to fabricate accounting for the greatly superior yield of finished sheet from ingot. The quality of the sheet produced was roughly equivalent for the two alloys except that the FS-85 had better flatness.

AD-606 297 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING: METHODS AND APPLICATIONS,
by Stuart E. Dreyfus. Revised 6 Oct 58, 14p P-1029
Unclassified report

forecast for the future period is best. For longer periods in the future, meteorological studies of accumulated past data are appropriate. When properly applied these produce valuable and useful results. It is this latter type of information that is discussed in this paper. (Author)

AD-606 858 Div. 25, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POISSON'S RATIO FOR HONEYCOMB SANDWICH CORES,
by George A. Hoffman. 7 Apr 58, 6p P-1330
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Honeycomb cores, Elasticity), (*Elasticity, Honeycomb cores), Sandwich construction, Structural properties, Strain (Mechanics), Stresses, Mathematical analysis, Integrals.

An interesting mechanical property of honeycomb cores is their Poisson's ratio: it is very sensitive to cell geometry and can assume values from zero to about three. Large values may be observed when flexing some slabs of honeycomb with flat cell walls, while rippled wall honeycombs demonstrate zero Poisson's ratio. The ratio of anticlastic curvatures is indicative of the value of Poisson's ratio for axial loading in the plane of the slab. Equilateral hexagonal and square cells were considered here; the doubled foil line the x-direction, and the cell width, a, the spacing between doubled foil lines (see insert, Fig. 1). The angle d between the x-axis and an adjacent wall is 60 degrees for regular hexagonal cells, though in practice it may be much less (the so-called under-expanded core), or well beyond 60 degrees over-expanded cores). Reducing the doubled foil line to a minimum, results in a nearly quadrilateral cell, herein assumed square. Conforming to common practice, the doubled foil line was assumed parallel or perpendicular to the loading or bend axis.

similar to those obtained for tungsten and tantalum in earlier studies. A high-voltage D C pulsing unit has enabled uninterrupted elevated temperature observation of the reaction of oxygen with molybdenum. The temperature range studied is 300 - 1000K. Although the utilization of this technique is in the preliminary stages, it is certain to enhance the versatility of field emission microscopy in the study of gas-metal reactions. This technique will be utilized in this laboratory as a major approach in the study of initial stages of oxidation of metals at temperatures less than 1000K. The effect of nonoxidizing gases, present as impurities in the oxidizing atmosphere, in altering the reaction kinetics has been studied further. In order to determine the extent of the effect fully, a mass spectrometer will be used to determine the concentration of gases present in the oxidizing chamber.

AD-606 806 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
DISPERSION STRENGTHENED COPPER-THORIUM BORIDE AND COPPER-ALUMINA ALLOYS PRODUCED BY MELTING AND CASTING.
Technical information series,
by Gilbert J. London. 6 Aug 59, 38p R59SD407
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Copper alloys, Dispersion hardening), (*Dispersion hardening, Copper alloys), Thorium compounds, Borides, Aluminum compounds, Oxides, Melting, Casting, Tensile properties, Creep, Stresses, Rupture, Loading (Mechanics), Resistance (Electrical), Microstructure, Diffusion.

This report describes work on producing dispersion strengthened copper alloys using melting and casting techniques as opposed to more conventionally used powder metallurgy techniques. Two methods of approach are described. One method produces copper-thorium boride alloys by liquid phase precipitation. Cu-2% ThB4 alloys produced by this technique show 10 to 80% improved tensile properties, two-to-three orders of magnitude improved creep and stress-rupture properties together with a 2 to 10% increase in electrical resistivity. The second method produces a copper-aluminum oxide alloy by a solid state diffusion reaction following melting and casting. The precipitate formed is extremely fine, resisting recrystallization at 1000C for 24 hours. (Author)

AD-606 824 Div. 17, 14, 26
OTS Prices: HC $3.00/MF $0.75

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
15 Sep 59, 95p
Unclassified report

Descriptors: (*Metals, Bibliographies), (*Alloys, Bibliographies), Indexes, Abstracting, Titanium alloys, Beryllium, Refractory metals, Steel, Stainless steel, Nickel alloys, Cobalt alloys, Iron alloys, Yttrium, Rare earths compounds, Material forming, Mechanical properties, Refractory materials, Laminates, Composite materials, Ablation, Boundary layer.

An annotated bibliography is given on light metals, refractory metals, high-strength alloys, rare earth metals, nonmetallic refractories, and composites.

AD-606 827 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
STRUCTURE IN TEXTURED GOLD FILMS.
Final rept.,
by J. E. Davey and R. H. Deiter. 4 Sep 64, 20p
Proj. RR008 03 46 5658
NRL 6121
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metal films, Gold), (*Gold, Crystal structure), Films, Metallic crystals, Crystal lattices, X-ray diffraction analysis, Electron diffraction analysis.

Gold films deposited by evaporation onto amorphous substrates at a wide variety of temperatures were examined by x-ray and electron-reflection diffraction, as well as by resistivity measurements. It was found that: (a) the (111) texture predominates at all deposition temperatures and appears almost exclusively between 370 and 500C; (b) the hexagonal partial structure, first noted by others in cold-worked bulk gold, appears in electron diffraction in this temperature range, along with the forbidden (110) reflection; (c) the deposition process introduces large concentrations of vacancies, which cluster under annealing into quite stable complexes. A large observed increase in resistivity and a contraction of the lattice as measured by x-ray diffraction are related to these vacancies. (Author)

Descriptors: (*Dynamic programming, Replacement theory), (*Replacement theory, Decision making), Optimization, Machines, Maintenance, Equations.

Dynamic programming is a mathematical technique applicable to multi-stage decision process problems. By observing that 'an optimal policy has the property that whatever the initial state and initial decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision' one can represent the process in the form of a functional equation. For finite processes, this equation can be solved recurrently, and one can determine the optimal policy. An interesting and important example of such a process is encountered when one considers the equipment replacement problem. One seeks to determine the optimal time to replace old equipment by new. This process is particularly amenable to dynamic programming, and an optimal policy can be generated under realistic assumptions. The functional equation approach of dynamic programming has also proved useful when applied to a wide variety of problems in the fields of industrial mathematics, logistics, economics, military planning, and pure mathematics and physics. (Author)

AD-606 301 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GENERALIZED EQUIPMENT REPLACEMENT STUDY,
by Stuart E. Dreyfus. 15 Mar 57, 19p P-1039
Unclassified report

Descriptors: (*Dynamic programming, Replacement theory), (*Replacement theory, Decision making), Machines, Maintenance, Equations, Costs, Mathematical models.

The functional equation technique of dynamic programming is useful in determining the optimal age of replacement of durable machinery. The paper reviews Bellman's analytic solution of a simplified model, presents a computation scheme applicable to more realistic models, and discusses various dynamic programming formulations applicable in the field of equipment replacement. (Author)

AD-606 327 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AUTOMATIC DATA-PROCESSING FOR PRODUCTION CONTROL,
by L. S. Hill. Dec 61, 21p P-2497
Unclassified report

Descriptors: (*Production control, Punched cards), (*Industrial production, Data processing systems), (*Data processing systems, Punched cards), Control systems, Recording systems, Automation, Computers, Programming (Computers), Industrial equipment, Machine tools.

It is the purpose of the paper to present in abridged form a synthesized procedure for control of production using punched-card methods. The system may be considered a framework for application to any manufacturing enterprise engaged in the fabrication and assembly of parts, regardless of product. Machines are used to record and coordinate all paperwork involved in manufacturing from time of raw material receipt through transformation into finished product. A collateral objective of this presentation is to indicate that mechanization of the production control system is a logical role for the Industrial Engineer. (Author)

AD-606 334 Div. 26, 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COST FINDING THROUGH MULTIPLE CORRELATION ANALYSIS,
by Paul R. McClenon. Aug 62, 16p P-2619
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Costs, Statistical analysis), (*Statistical analysis, Costs), Correlation techniques, Operations research, Management planning, Decision making.

Multiple correlation analysis will not seriously compete with established costing practices, but under some circumstances will prove useful for developing cost estimates not determinable by other means. This paper presents a simple example in order to give accountants a glimpse of the technique and to enable them to recognize potential applications. Consultation with a statistician or a good textbook is urged.

AD-606 520 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
MAXIMIZATION OF THE RELIABILITY OF A COMPLEX SYSTEM BY THE USE OF ITEMS IN SEQUENCE,
by Leo A. Aroian. [Apr 60] 24p STL/TM/60-0000-00034
Unclassified report

Descriptors: (*Reliability, Quality control), (*Redundant component, Reliability), Optimization, Distribution theory, Life expectancy, Failure (Mechanics), Probability.

The basic theory of the use of items in sequence in a complex system is developed. Particular examples are given for the exponential distribution, the terminated exponential, the normal distribution, the exponential with normal distribution wearout, and the Weibull distribution. It is noted that the problem, statistically is the same as the distribution of the sum of independent items. The treatment of degradation due to disuse of an item is included. (Author)

AD-606 526 Div. 26, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ISOQUANT APPROACH TO INVESTMENT DECISION PROBLEMS,
by Jack Hirshleifer. 23 Aug 57, 46p P-1158
'Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Decision theory, Money), (*Budgets, Optimization), (*Management planning, Budgets), Economics, Commerce, Decision making.

The given notes constitute an attempt to solve, through the use of isoquant analysis, the problem of optimal investment decisions (in business parlance, the problem of capital budgeting). The initial section reviews the principles laid down in Irving Fisher's justly famous works on interest, to see what light they shed on two competing rules of behavior currently proposed by economists to guide business investment decisions--the Present-Value Rule and the Internal-Rate-of-Return Rule. The main concern is to show how Fisher's principles

Physical properties, Tests, Tables, Models (Simulations), Design, Systems engineering.

The report describes the development of a System Analysis Model (SAM) utilizing equipment characteristics and maintenance environments of Air Force equipments, which provides a guide for technical writers in the selection of the most efficient fault isolation presentations for current and R and D systems. From this model, three characteristics which affect the efficiency of fault isolation presentation formats were selected for experimental manipulation and evaluation. These characteristics: (1) type of circuitry, (2) type of indicators, and (3) system complexity were used to evaluate the relative efficiency, in terms of performance accuracy and time, of three fault isolation presentation formats: (1) standard schematics, (2) data flow diagrams, and (3) proceduralized instructions. Their nonsignificant differences suggest that the criterion for choosing between standard schematics and data flow diagrams would be the cost of development when dealing with equipments with similar characteristics. Significantly, proceduralized instructions were found to be more efficient than the other two formats. (Author)

AD-606 265 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
GENERALIZED ANALYSIS OF AERIAL CAMPAIGNS AGAINST STRATEGIC TARGETS,
by R. Schamberg. 9 May 57, 39p P-1017
Unclassified report

Presented at the Annual Meeting of the Operations Research Society of America (5th), 9-10 May 57. Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Symposia, Strategic bombing), (*Strategic bombing, Aerial warfare), (*Aerial warfare, Strategic bombing), Strategic warfare, Targets, Costs, Aircraft, Weapons, Defense systems, Equations, Aviation personnel.

An analytic technique is described for direct determination of the outcome of optimal aerial bombing or reconnaissance campaigns against strategic targets, without the customary laborious exploration of variations in attack strategy. The scope of this analysis permits wide latitude in the nature of the strategic campaign and its environment, including the following: the criterion defining an optimum campaign may be that of minimum cost, or minimum air crew loss for a fixed level of target destruction, with or without additional constraints such as specified maximum campaign duration; aircraft losses may be due to enemy area and local defenses, non-combat causes, or due to destruction while on their own base. Several examples are used to illustrate how the analytic method presented here leads to a better understanding of the significant features of strategic campaigns, and their sensitivity to variations in assumptions, than can be gleaned from an essentially empirical study of many individual campaigns. (Author)

AD-606 270 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
KLAUS KNORR ON WAR POTENTIAL: A BRIEF REVIEW,
by Malcolm W. Hoag. 18 Nov 57, 4p P-1025
Unclassified report

Descriptors: (*Mobilization, Reviews), (*Reviews, Mobilization), (*Economics, Warfare), Mobilization, Deterrence, Nuclear warfare, Cold war, Political science, Sociology.

Professor Knorr finds contemporary relevance in the notion of mobilizable war potential, and devotes ninety-odd per cent of his pages to the case, typified by World War II, in which a nation has an opportunity to mobilize its strength fully after hostilities have begun. He deals lucidly and sensibly with this contingency, and can justly claim achievement of his objective: (1) a synthesis of the extensive post-World War II literature on economic mobilization which (2) incorporates political and sociological insights bearing upon the will and the ability to organize for fighting.

AD-606 273 Div. 18, 28
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SYSTEMS RESEARCH LABORATORY'S AIR DEFENSE EXPERIMENTS,
by W. C. Biel, R. L. Chapman, J. L. Kennedy, and A. Newell. 23 Oct 57, 51p P-1202
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Systems engineering, Air defense command), (*Symposia, Human engineering), (*Air defense command, Operations research), Performance (Human), Learning, Behavior, Simulation, Air force personnel, Defense systems, Warning systems, Leadership, Motivation, Tracking, Adjustment (Psychology).

The desired performance of complex systems can be realized only through designing and managing them for operational flexibility. This can be done by harnessing the learning ability of men in organizations. Conditions for encouraging men to adapt system's resources to most efficient use follow from the organism analogy--a key notion for explaining the behavior of the four crews studied. In addition, the simulation techniques developed in the course of the research provide a means for continued 'head-on' attacks on a crucial problem of the present day--that of better understanding of the adaptation process in organizations, so that it can be used and controlled. The paper is in the form of a report of a scientific search. The story of experimental mistakes, modifications in method, and successive insights is presented to convey the essence of an ambitious investigation at the frontier of knowledge where the terrain is not well-mapped and the research tools are being developed as needed. (Author)

AD-606 299 Div. 18, 1, 22, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RELATIONSHIPS BETWEEN WEAPONS AND LOGISTICS EXPENDITURES,
by Murray A. Geisler. 28 Aug 56, 29p P-1036
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Weapons, Budgets), (*Logistics, Budgets), Aircraft, Maintenance, Management engineering, Inventory control, Economics, Air force budgets.

The paper discusses the trade-offs which are always made -- implicitly or explicitly -- between investing in a weapon and in its logistics support. The importance of some well-known general relationships are considered: (1) A weapons system, its supply support, and its maintenance support are all one package and for many management purposes should be considered together.

18. Military Sciences and Operations

AD-606 156 Div. 18, 26, 30
OTS Prices: HC $3.00/MF $0.75

Air Force Systems Command, Washington, D. C.
PERT PROGRAM MANAGEMENT AND DEVELOPMENT PLAN,
Apr 62, 100p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Air force systems command, Research program administration), (*Management engineering, Air force systems command), Weapon systems, Costs, Department of Defense, Management planning, Personnel, Training, Air defense command, Data processing systems.

PERT (Program Evaluation and Review Technique) is a management technique that utilizes the concept of time-based network program planning. AFSC recognized the value of PERT for application on critical or complex weapons systems and projects and, in the past two years has become its largest user. Now, the basic techniques are to be extended to include cost and other selected management parameters. However, since PERT is not an end in itself in spite of publicity accorded it, this system must be seen in perspective as only one of numerous techniques used in management of AFSC programs. This plan considers this throughout the management and development activities which are described in it.

AD-606 169 Div. 18, 15, 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE DISTRIBUTION OF THE TIME-DURATION OF STOCHASTIC DUELS.
Scientific rept.,
by C. J. Ancker, Jr. and A. V. Gafarian. 10 Aug 64, 32p SP-1017/007/00

Unclassified report

Descriptors: (*Stochastic processes, Game theory), (*Sampling, Operations research), (*Warfare, Game theory), (*Game theory, Warfare), Military tactics, Logistics, Mathematical models, Decision making, Statistical analysis.

The Theory of Stochastic Duels is extended by considering the distribution of time-to-completion of the fundamental duel. The model has fixed kill probabilities and either random or fixed time between rounds fired. Time-limitation is included. Special cases and examples are worked out. Clearly, the time-duration of combat has both tactical and logistic implications for the decision-maker. (Author)

AD-606 202 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WORLD-WIDE HISTORIC VICTORY OF THE SOVIET PEOPLE,
29 Jan 59, 36p T-110
TT 59-10556

Unclassified report

Trans. from Voennaya Mysl' (USSR) 1955, no. 5.

Descriptors: (*Warfare, Public opinion), Military strategy, Military tactics, USSR, Political science, Foreign policy, Threat evaluation.

From a political viewpoint, this editorial is an exposition of the current Soviet view on the causes and results of World War Two. From a military viewpoint the editorial contains a number of interesting points for a Western reader: (1) Some indications of the weakness in Soviet military thinking and planning in the pre-World War Two Period; (2) An enumeration of problems in the area of strategy and tactics to which Soviet planners are called upon to devote their attention if they are to be prepared for future emergencies; (3) A discussion of factors, operative in the current international framework and now in evidence, which constitute long-range warning signs of possible war in the future. (Translator)

AD-606 205 Div. 18
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME SOVIET VIEWS ON THE NATURE OF A FUTURE WAR AND THE FACTORS DETERMINING ITS COURSE AND OUTCOME: SOVIET MILITARY SCIENCE ON THE CHARACTER OF CONTEMPORARY WAR; ON THE BASIC FACTORS DETERMINING THE COURSE AND OUTCOME OF WAR AND COMMENTS,
by I. S. Baz' and I. Korotkov. 15 Sep 58, 54p T-97
TT 64 71445

Unclassified report

Trans. from Voennyi Vestnik (USSR) 1958, v. 38, no. 6, p. 19-29; Sovetakaya Aviatsiya (USSR) 1958, 12 Aug.

Descriptors: (*Warfare, Military strategy), (*Military strategy, USSR), Armed forces (Foreign), Strategic warfare, Nuclear weapons, Defense systems, Aerial warfare, Communism, Economics, Political science, Social sciences, Military tactics, Military publications.

Two articles from the Soviet military press which treat some major problems of Soviet military thought in unusually comprehensive and systematic fashion are presented. The first, entitled 'Soviet Military Science on the Character of Contemporary War,' by Colonel I. S. Baz', was published in the June 1958 (No. 6) issue of Military Herald, the Defense Ministry monthly which deals chiefly with problems of ground force officers. The second, entitled 'On the Basic Factors Determining the Course and Outcome of War,' by Colonel I. Korotkov, was published in the Air Force daily, Soviet Aviation, on August 12, 1958. The Military Herald article draws together and provides a theoretical framework for views on the character of a future war expressed piecemeal by other Soviet authors in the past. The conceptual framework of the discussion is embodied in the context of an attack on the historical indeterminism of Clausewitz's theory of wars.

AD-606 215 Div. 18, 26
OTS Prices: HC $2.25/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SPECIFICATION OF OPTIMUM FAULT ISOLATION PRESENTATION.
Final rept. for Mar 63-Mar 64,
by W. R. Atchley, J. Ver Hulst, and D. J. Lehr.
Jun 64, 112p
Contract AF33 657 10834, Proj. 7184, Task 718406
AMRL TDR64 57

Unclassified report

Descriptors: (*Air force equipment, Maintenance), Malfunctions, Instruction manuals, Specifications,

Prpared for presentation at the joint AIIE-ORSA-TIMS Symposium on System Simulation, Hotel Statler, New York City, 16-17 May 57. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Systems engineering), (*Air defense command, Operations research), (*Systems engineering, Air defense command), Simulation, Human engineering, Defense systems, Performance (Human), Air force training, Learning.

This research attempted to obtain the predictable features of a closed system by exploiting man's capacity to seek and find problem solutions. That is, if man could be motivated to seek the system's goal, and if he were provided knowledge of operational results, a disparity between actual and desired performance might serve as an error feedback to trigger adaptation of operating practices to improve effectiveness. To explore this possibility, a particular man-machine system, a part of the air-defense network, was simulated in the laboratory. Included in the laboratory system were not only functional representations of the machine components but also the men themselves--under such conditions as to permit them the latitude of action found in the real world. Such a system was exposed to successively more difficult task situations, the results of performance were reported back to the crew, and the questions asked were: Could men learn to improve system performance; 'what' did they learn; and 'why' did they learn.

AD-606 373 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION IN RAND'S LOGISTICS SYSTEMS LABORATORY,
by William W. Haythorn. 30 Apr 57, 14p P-1075
Unclassified report

Prepared for presentation at the joint AIIE-ORSA-TIMS Symposium on System Simulation, Hotel Statler, New York City, 16-17 May 1957. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Logistics, Simulation), (*Air force operations, Logistics), Inventory control, Data processing systems, Management engineering, Air Force research.

The techniques of simulation being developed for the Logistics Laboratory are applicable to many kinds of supply and distribution systems. With modifications, it should be possible to extend the techniques to many industrial and business enterprises where service-testing of new management policies and procedures is desirable but difficult to implement because of organizational interactions or the danger of disrupting ongoing activities. The kinds of problems that seem especially relevant are those involving inventory control, inventory size, centralized versus decentralized procurement, centralized versus decentralized stocking, etc.

AD-606 386 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE WORTH OF PRINCIPLES OF WAR,
by B. Brodie. 21 May 57, 23p P-1092
Unclassified report

The following lecture was delivered on 7 Mar 57, at the U. S. Army Command and General Staff College, Fort Leavenworth, Kans.

Descriptors: (*Warfare, Theory), (*Military strategy, Theory), Military tactics, Armed forces operations, Naval operations, History, Decision making, Officer personnel.

The principles of war are discussed in terms of historical and present day military strategy.

AD-606 435 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GERMAN DISCUSSION OF ATOMIC WEAPONS AND THE LAW,
by Ewald W. Schnitzer. 17 Jul 57, 10p P-1106
Unclassified report

Descriptors: (*Nuclear weapons, Law), (*Law, Nuclear weapons), (*West Germany, Nuclear weapons), Armament, Political science, Leadership, Social sciences, Government (Foreign).

The subject of atomic armament for the Bundeswehr, the newly established armed forces of West Germany is discussed. For the first time the question of the relationship between atomic weapons and the law has been discussed in the German press. On May 18, 1957, a letter to the editor was published in Frankfurter Allgemeine Zeitung uder the heading 'Atomic Weapons and the Law'. The letter is reproduced in translation. Although it furnishes only scant material on the subject, it does present a first definition of the problem, and deals with an issue which may have far-reaching political implications.

AD-606 437 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME STRATEGIC IMPLICATIONS OF THE NUCLEAR REVOLUTION,
by Bernard Brodie. 14 May 57, 22p P-1111
Unclassified report

Presented before the Institute of World Affairs, University of Utah, 14 May 57.

Descriptors: (*Nuclear weapons, Limited war), (*Limited war, Nuclear weapons), History, Strategic bombing, Nuclear bombs, Urban areas, Population, Defense systems, Strategic air command, Deterrence, Cold war, Nuclear warfare.

The discussion is concerned with the problems involved in the use of nuclear weapons in limited warfare. The conclusion states: ...'In order to make work at all anything as arbitrary and forced as limitations upon war are likely to be, it would seem that one major requirement is that transgressions or violations be very easy to recognize and very difficult to deny. This is not to say that we may not use nuclear weapons in limited war; it only underlines the problem of finding out how we can use them without thereby signaling the abandonment of restraints.'

AD-606 443 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IMPLICATIONS OF NUCLEAR WEAPONS IN TOTAL WAR,

(2) The number of operationally-ready aircraft sometimes may possibly be increased more economically by devoting additional resources to supply or maintenance support rather than by buying additional units of the end item. (3) Similarly, shifting resources between supply and maintenance could be a means of increasing the operationally ready inventory. (4) In managing a weapon, Standards should not be set for one logistics activity without regard to the others. For example, with a fixed budget, an effort to reduce the AOCP rate too far may so impinge on maintenance resources as to reduce the number of operationally ready weapons. The opposite is also possible. (Author)

AD-606 320 Div. 18
OTS Prices: HC $4.00/MF $1.00

International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 35, 21 Apr-20 May 64.
20 Jun 64, 132p IEC-20130
Contract AF19 626 8
ESD TDR64 447

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Strategic air command, Control systems), (*Control systems, Strategic air command), Test methods, Simulators, Training, Air force personnel, Air force systems command, Air defense command, Data transmission systems, Data processing systems, Programming (Computers), Management engineering, Defense systems, Display systems, Systems engineering, Communications systems.

Information is presented concerning each Milestone established in the 465L System Test Plan. The Milestone information is organized generically by Centrals and other descriptive titles for activities of similar scope. These, in turn, are consolidated according to subsystem and comparable collective designations. Testing not attributable to the 465L System Test Plan Milestones are reported in paragraphs associated with their related test activities. The System Test Facility (STF) located at the Contractor's Project Headquarters supported demonstrations, special tests and training. Specific activities reported for the STF included continuation of RFI testing to determine the effectiveness of Circuit Card Suppressors and Signal/Power Line Filters, updating the three production RCC's in compliance with the approved Baseline Configuration, and the conduct of validation tests on the D-35 Drawer Tester.

AD-606 360 Div. 18, 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DESIGN CHANGE IMPACTS ON AIRFRAME PARTS INVENTORIES,
by James W. Petersen and Wilbur Steger. 31 Oct 57, 35p P-1055, rev.

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Inventory control, Obsolescence theory), (*Obsolescence theory, Inventory control), (*Airframes, Inventory control), Air force procurement, Economics, Logistics, Management engineering, Spare parts.

This study is an attempt to provide part of the information needed to assess the costs of holding a spares inventory, namely, the cost of airframe inventory which becomes obsolete as a result of design changes. Such information, for example, would be extremely useful in determining a suitable spares procurement policy for a new military weapon.

AD-606 369 Div. 18, 33
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PROPOSAL FOR REDUCING THE COST OF LOGISTICS SUPPORT,
by James W. Petersen and Wilber Steger. 23 Apr 57, 8p P-1068

Unclassified report

Descriptors: (*Logistics, Costs), (*Costs, Logistics), (*Spare parts, Air force procurement), Transportation, Storage, Degradation, Inventory control, Management engineering.

Deferral of procurement is distinctly worthwhile for some items. These are, for the most part, expensive spare parts which are few enough to be managed with considerable attention, and also of such a nature that spares consumption is almost certainly sure to be low during the phasing-in of new equipment. The savings indicated may be as high as sixty per cent of the total cost of expensive items under the present supply system, and undoubtedly exceeds thirty per cent of this cost. Since expensive spares consititute more than fifty per cent of the total dollar value of the supply system, the indicated savings are very substantial. The deferred procurement system does not result in a noticeable reduction of the effectiveness of the supply system if deferral is practiced just long enough to collect sufficient data to make a substantially improved forecast of future consumption. In the current study, this period was approximately eighteen months in length.

AD-606 371 Div. 18, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE COMPUTATIONAL SOLUTION OF DYNAMIC-PROGRAMMING PROCESSES. I. ON A TACTICAL AIR-WARFARE MODEL ON MENGEL,
by Richard Bellman and Stuart Dreyfus. Rev. 23 May 57, 24p P-1072

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerial warfare, Mathematical models), (*Dynamic programming, Aerial warfare), Military tactics, Game theory, Air force operations, Statistical analysis, Functions.

The paper is devoted to the computational solution of dynamic programming processes. The functional-equation approach is used to treat a tactical air-warfare model that A. Mengel previously considered by means of classical variational techniques. (Author)

AD-606 372 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION IN RAND'S SYSTEM RESEARCH LABORATORY,
by Robert L. Chapman. 30 Apr 57, 12p P-1074

Unclassified report

Descriptors: (*Costs, Weapons systems), (*Weapon systems, Information retrieval), (*Information retrieval, Weapon systems), Subject indexing, Abstracting, Documentation, Periodicals, Military publications, Defense systems, Personnel, Statistical data, Automation, Air force systems command.

RAND's Cost Analysis Department has developed a Data Bank to satisfy its need for a comprehensive depository of cost and resource information covering most weapon and support systems in the military establishment. The intention was to provide a single center for material previously available only in individual analysts' files, to augment this with general purpose information, and thus create a central data repository for all analysts to use. It attempts to be a collective memory for the whole of the Cost Analysis Department, organized in an informal fashion as an analyst would maintain his own file. (Author)

AD-606 585 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMICS OF A DUAL CAPABILITY,
by Malcolm W. Hoag. 4 Nov 57, 12p P-1195
Unclassified report

Descriptors: (*Warfare, Economics), (*Economics, Warfare), Costs, Limited war, Nuclear warfare, Defense systems, Aerial warfare, Nuclear weapons, Air defense command, Strategic bombing, Strategic warfare.

A 'dual capability' can be defined as a military capability for fighting all-out wars or limited wars. Whether we can and should support a dual capability, however, becomes a real economic issue only if we desire different kinds of forces to fight these different kinds of war. If, in accord with the definition given for this seminar, we limit war by constraining only its objectives, area of combat, and resource commitment, the same strategic airpower that is our main deterrent to all-out war can be militarily effective in fighting limited wars. A small strategic bomber force could be diverted quickly to fight in a war so limited, and its attrition at the hands of the enemy would probably be negligible if used in areas not covered by the Soviet air defense network. It need not remain vulnerably based in exposed forward areas, and, most important, its use need not detract from our general deterrent power. The decision to use such a force would itself be the signal to bring the remainder of our strategic force to a higher state of alert, so raising our retaliatory capability.

AD-606 610 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON NATO POOLING,
by Malcolm W. Hoag. 30 Dec 57, 14p P-1242-RC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Political science, Defense systems), (*Defense systems, Reviews), (*Reviews, Defense systems), Armed forces (Foreign), Military budgets, Government (Foreign), United States government, Defense systems, Weapon systems, Costs, Guided missiles, Military strategy, Deterrence, Military organizations.

The books under review urge greater pooling of effort in NATO, especially of the Military research and development efforts that are most likely to be affected by Sputnik. This review concentrates upon this theme and, more briefly, upon burden sharing.

AD-606 690 Div. 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET CIVIL DEFENSE PROGRAM,
by Leon Goure. Mar 62, 24p P-2554
Unclassified report

This lecture was prepared for presentation at the National Meeting of the American Chemical Society, Division of Industrial and Engineering Chemistry in Washington, D. C. 27 Mar 62.

Descriptors: (*Civil defense systems, USSR), (*USSR, Civil defense systems), Government (Foreign), Shelters, Population, Training, Propaganda, Symposia.

Soviet civil defense is the subject of public discussion in the United States with a great deal of conflicting information being published about it. Following the late President Kennedy's announcement of plans to accelerate and expand the United States civil defense and shelter construction program, the Soviet Union has done its best to cast doubts on the value of the U. S. effort as well as to deny the existence of a similar civil defense program in the Soviet Union.

AD-606 847 Div. 18, 20, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE CRISIS IN MILITARY AFFAIRS,
William W. Kaufmann. Rev. 28 Feb 58, 48p
P-1295
Unclassified report

This paper is a somewhat extended review of Nuclear Weapons and Foreign Policy, by Henry A. Kissinger. It was scheduled to appear in World Politics, Jul 58. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, Nuclear weapons), (*Nuclear weapons, Foreign policy), Political science, Military strategy, United States government, Disarmament, Defense systems, Armed forces budgets, Weapon systems, Strategic air command, Strategic warfare, Nuclear warefare, Limited war, Economics, Reviews.

In the years since World War II, American statesmen have found themselves increasingly preoccupied with military problems in their efforts to maintain and advance the interests of the United States. Not only have they had to decide how to deal with the various military threats to these interests. They have also had to take strategic considerations and the risk of war into account in all their day-to-day dealings with the outside world. Their task would have proved difficult enough had they had to confront the hostility of the Soviet empire with the traditional means of warfare. It has become almost unimaginably complex as a result of growing Russian power and what appears to be a continuing revolution in the technology of military weaponry. As a somewhat extended review of Nuclear Weapons and Foreign Policy, by Henry A. Kissinger, this

by Bernard Brodie. 8 Jul 57, P-1118
Unclassified report

Prepared for publication in the Royal Canadian Air Force Staff College Journal, 1957.

Descriptors: (*Strategic bombing, Nuclear warfare), (*Nuclear warfare, Strategic bombing), (*Nuclear weapons, Nuclear warfare), (*Warfare, Nuclear warfare), History, Nuclear bombs, Urban areas, Population, Survival, Shelters, Nuclear warfare casualties, Nuclear explosions, Defense systems, Air defense command, Strategic air command.

The discussion on total nuclear warfare concludes: '. . . Barring revolutionary and presently unforeseen advances in air defense, an unrestricted strategic air campaign in a war in which the United States is engaged is bound to be decisive. It does not matter greatly whether the number of nuclear weapons-on-target required to guarantee decisiveness is a few score or a few hundred, because we are in realms of figures that are well within the capabilities at least of the United States (the critical factor being, of course, delivery capability rather than size of the nuclear stockpile). And it is equally certain that these figures are now or soon will be within the capabilities of one or more other powers. Figures for a strategic-bombing campaign running into the thousands of bombs-on-target are likely to be either morbidly fanciful or pointed toward a campaign aimed not merely at a simple military decision but at complete national obliteration.'

AD-606 453 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTERNATIONAL REGISTRATION OF THE ATOM,
by Arnold Kramish. 26 Jul 57, 10p P-1134
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Disarmament, Nuclear weapons), (*Nuclear weapons, Disarmament), (*United Nations, Disarmament), Radiation hazards, Radioactive fallout, Nuclear explosions, Political science, United States, Great Britain, USSR.

The discussion is centered around the following question: In view of the Universal Declaration of Human Rights which proclaims the individual's 'right to life, liberty and security of person,' is it not within the province of the United Nations to enunciate the following principle. 'That nations and individuals engaged in nuclear research and development operations of any sort have an obligation to do so at minimum risk to other nations and to the individuals of all nations. Further, it is the common right to know of any such operations which possess a potential of harm or could conceivably magnify themselves to a stage dangerous to individual life and security.' On the whole, the last decade has shown a discouraging lack of progress in disarmament negotiations. This is due, in large measure, to the comprehensive, sweeping nature of the plans submitted. And if we are now beginning to make any progress in this field, it is because emphasis has been changed to the achievement of step-by-step goals. But the final goal, disarmament in its absolute sense, may never be achieved--the common goal must be the disciplined manufacture and use of armaments.

AD-606 455 Div. 18, 1
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
INTERCONTINENTAL MILITARY AIR TRANSPORT: AN APPLICATION OF A MODEL FOR THE STUDY OF AIRCRAFT PROCUREMENT POLICIES,
by C. B. McGuire. 30 Aug 57, 61p P-1138
Unclassified report

Paper was prepared for use as Chapter 11 in a book entitled 'The Economics of Defense in the Nuclear Age,' by Charles Hitch and Roland McKean, intended for publication.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transport planes, Air Force procurement), (*Air Force procurement, Aircraft), Logistics, Costs, Economics, Mathematical models, Operation.

AD-606 482 Div. 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TO STRENGTHEN THE POWER OF AVIATION,
by K. A. Vershinin. 9 Sep 64, 11p
FTD TT64 474; TT 64 71472
Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 27 (12243) 1 Feb, p. 2.

Descriptors: (*Air force training, USSR), Aviation personnel, Air force personnel, Defense systems, Air transportation, Armament, Communism, Armed forces (Foreign).

The article discusses the tactical training of aviation units and subunits. Improvement and perfection of tactical habits in the use of rocket-carrying equipment were developed with consideration of the complex circumstances of a modern battle and newest means of the Soviet armed forces. During the past trainings, carried out in cooperation with other types of services, Soviet aviators have demonstrated a better tactical training, skill in expertly handling the entrusted equipment.

AD-606 531 Div. 18, 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WAR GAMING,
by Herman Kahn and Irwin Mann. 30 Jul 57, 14p
P-1167
Unclassified report

Descriptors: (*Armed forces operations, Game theory) (*Game theory, Armed forces operations), Operations research, Military strategy, Probability.

An introduction to the basic principles of war gaming covering the following topics: The informal game, rule games, the formal minimum rule game, and realistic war games.

AD-606 581 Div. 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RAND COST ANALYSIS DEPARTMENT DATA BANK,
by S. C. Slivinski. Sep 64, 9p P-2985
Unclassified report

Prepared for presentation at a meeting of the Joint Study Group on Military Resource Allocation Methodology at the RAND Corp., Santa Monica, Calif., 7 Oct 64.

19. Navigation

AD-606 353 Div. 19
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PRINCIPLES OF SELF-CONTAINED NAVIGATION,
by H. H. Bailey. 29 Mar 57, 21p P-1044
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Navigation, Reviews), Position finding, Celestial navigation, Inertial navigation, Dopler navigation, Gyro compasses, Acceleration, Differential equations.

Following a brief introduction on the nature and magnitude of the current effort in self-contained navigation, the basic functions of all navigation are analysed. Several methods of fixing are discussed, and it is shown that celestial navigation is limited by an inherent difficulty in establishing an accurate vertical on board a moving (accelerating) vehicle. Several methods of dead-reckoning are also analysed, and it is pointed out that the first to be free of fundamental (as opposed to instrumental) limitations is that using a doppler radar and a gyroscopic heading reference. Finally, the basic principles of inertial navigation are developed and presented in a simple, physical way. These systems solve the problem of establishing an accurate vertical by measuring vehicle accelerations; and simultaneously (and inseparably), by establishing an accurate vertical, they permit meaningful acceleration measurements to be made. The physical basis for Schuler Tuning is explained in elementary terms. The fundamental differential equation of inertial systems is derived. (Author)

AD-606 629 Div. 19, 1, 5, 28
OTS Prices: HC $3.00/MF $0.75

HRB-Singer, Inc., State College, Pa.
A HUMAN FACTORS REVIEW OF THE AN/TSQ-47 AIR TRAFFIC CONTROL/COMMUNICATIONS SYSTEM.
Rept. no. 6 (Final),
by Allen C. Busch and Robert B. King.
Jun 64, 64p HRBI-353-R-6
Contract AF19 628 439, Proj. 482L
ESD TDR64 446 Unclassified report

Descriptors: (*Air traffic control systems, Human engineering), (*Air traffic controllers, Air traffic control systems), (*Communication systems, Control systems), Air traffic, Airport radar systems, Mobile, Shelters, Safety, Noise, Design.

Category I testing has recently been completed on the AN/TSQ-47 Mobile Air Traffic Control/Communications System. This report presents a review of human factors problems which occurred during the Category I testing phase and in prior development phases of the system. The design changes suggested are based on recommendations made prior to the completion of Category I testing for the purpose of outlining tentative system deficiencies. Each shelter is reviewed separately, and problems common to all system facilities are discussed. The major topics of review are the operational considerations for each shelter, the working environment, and the design of consoles and work places. (Author)

AD-606 813 Div. 19, 8, 12
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
SUN FINDER OUTPUT CIRCUITRY.
Thesis,
by Robert Burns McCullough. May 60, 45p
Contract AF04 647 303, Proj. 52 156
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Position finding, Sun), (*Celestial guidance, Sun), (*Navigational computers, Circuits), Design, Mars probes, Automatic navigators, Digital computers, Magnetic cores, Solar cells, Prisms(Optics), Magnetic core storage, Switching circuits, Wiring diagrams.

This thesis analyzes a specific design problem and proposes a solution in the problem of transforming the output of a sun finder into the input required by a magnetic core digital computer. The proposed solution consists of three essentially separate circuits. The first circuit introduces a constant angle dead zone into the sun finder output. The second turns the dead zone on and off as directed by the computer. The third stores the sun finder output energy and uses it to switch the input cores of the computer. (Author)

paper discusses the Merits of the book in terms of its significance in matters of both military and foreign policy.

AD-606 856 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
'WAR-1974', BY ROBERT B. RIGG.
A book review,
by G. C. Reinhardt. 2 Apr 58, 8p P-1326
Unclassified report

Review of the book entitled 'War-1974' by Robert B. Rigg.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Reviews, Nuclear warfare), (*Nuclear warfare, Theory), Military tactics, Nuclear weapons.

'War-1974' by Lt. Col. Robert B. Rigg is short on humor, intentional or otherwise. Those concerned with the international impact of a technological breakthrough (in tactics as well as hardware) will be interested. Col. Rigg submits a forecast substantiated, he says, by (quoted) progress that offers a provoking checklist of possible vs. impossible developments. (Author)

AD-606 867 Div. 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RECIPROCAL FEAR OF SURPRISE ATTACK,
by T. C. Schelling. 16 Apr 58, rev. 28 May 58,
30p P-1342
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Warfare, Fear), Psychological warfare, Threat evaluation, Game theory, Decision theory, Probability.

At the Twentieth Party Congress in January, 1956, a directive was given to 'build atomic power plants with a total capacity of 2,000,000 kw to 2,500,000 kw in 1956-1960.' When this order was published, observers in the West naturally questioned whether 'total' referred to the rated thermal or electrical capacity of the atomic power stations. The United States and British programs have been publicized in terms of how much electricity (or useful power) will be produced rather than what the total heat capacity of the power reactors might be. The latter figure would be more than three times the electrical rating, depending on the thermodynamic efficiency of the system. The dangers inherent in utilizing this ambiguous Soviet data are discussed.

AD-606 389 Div. 20, 14
OTS Prices: HC $3.00/MF $0.75

Flesset (E. H.) Associates, Inc., Los Angeles, Calif.
RADIATION DAMAGE TO PLASTICS,
by Edward Gerjuoy, Olen Nance, and Horace A. Ory.
Mar 61, 82p PLES-TR-108, PLES-C13-61(U)202
Contract AF29 601 1897

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plastics, Radiation damage), (*Radiation damage, Plastics), Nuclear absorption, Mathematical analysis, Ionization, Excitation, Chemical bonds, Rupture, Chemical reactions, Structural properties, Electrical properties, Thermal properties, Mechanical properties, Nuclear particles, Photons, Transport properties, Organic compounds, Hydrocarbons, Organic oxygen compounds, Paramagnetic resonance, Absorption spectrum, Polymers, Thermoplastics, Thermosetting plastics, Polyethylene plastics.

The basic phenomena involved in radiation damage to plastics are reviewed in detail and interpreted in terms of modified responses of irradiated plastics to subsequent stresses. The topics considered include mode of energy deposition and partition between thermal and specific effects; the primary physical processes which are involved in ionization, electronic excitation, and bond rupture; the types of species produced and their chemical behavior; the structural changes which result from induced chemical reactions; and the evaluation of radiation damage as reflected by variation of electrical, thermal, and mechanical parameters of materials with radiation dose. (Author)

AD-606 401 Div. 20, 25
OTS Prices: HC $2.00/MF $0.50

High-Energy Physics Lab., Stanford Univ., Calif.
A DETERMINATION OF RADIATIVE TRANSITIONS WIDTHS OF EXCITED STATES IN C(12),
by H. L. Crannell and T. A. Griffy. Jul 64, 27p
HEPL-335
Contract Nonr225 67

Unclassified report

Supported in part by the Air Force Office of Scientific Research and the National Science Foundation.

Descriptors: (*Carbon, Electron transitions), (*Electrons, Nuclear scattering), Atomic energy levels, Elastic scattering, Inelastic scattering.

New absolute values for the elastic and inelastic electron scattering cross sections from C(12) are presented for a range of q square from 0.75 F to the -2 power to 3.14 F to the -2 power. A new method of analysis has been employed to obtain the radiative widths for the first three excited states in C(12) from the measured inelastic cross sections. This method of analysis does not depend on a model for the transition charge distribution and is useful in determining the multipolarity of the transition. (Author)

AD-606 431 Div. 20, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE PRINCIPLE OF INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY; I: ONE-DIMENSIONAL CASE,
by Richard Bellman, Robert Kalaba, and G. Milton Wing.
11 Jun 57, 33p P-1102

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from best available copy.

Descriptors: (*Neutron transport theory, Nonlinear differential equations), Neutron scattering, Critical assemblies, Fission, Neutron capture, Stochastic processes, Mathematical models.

Consideration is given to a one-dimensional version of the reflection and transmission of neutrons, and the phenomenon of critical mass. Although the effects of fission, capture and forward and backward scattering are considered, collisions between neutrons are not taken into account. The basic model is stochastic, with standard transport theory derived on the basis of expected values. As the explicit form of the higher moments indicates, an expected value theory yields a quite inadequate view of the distribution of reflected and transmitted neutrons in the neighborhood of critical mass. Some numerical results describing these distributions obtained from the solution of forty simultaneous nonlinear differential equations are presented.

AD-606 475 Div. 20, 25
OTS Prices: HC $3.00/MF $0.75

Nevis Labs., Columbia Univ., Irvington-on-Hudson, N. Y.
MUON DEPOLARIZATION IN SOLIDS.
Doctor's thesis,
by Bob Eisenstein. May 64, 86p CU-230, Nevis-124
Contract Nonr266 72

Unclassified report

Prepared in cooperation with National Science Foundation.

Descriptors: (*Muons, Particle beams), Radioactive decay, Positrons, Distribution, Polarization, Quenching (Inhibition), Electron capture, Solids, Semiconductors, Aluminum, Sulfur, Aluminum compounds, Oxides, Boron compounds, Carbides, Dielectric properties.

When polarized positive muons stop in a solid, they may be depolarized prior to their decay. The presence of a magnetic field along the direction of initial polarization will inhibit, or quench, some of this depolarization. A study was made of depolarization and quenching in a variety of solids, including semiconductors, at temperatures as low as 4.2K. No evidence was found that any muon depolarization is associated with the formation of a muonium atom which is bound for > 10 to the-10th power sec, even in samples at 4.2K. For many samples and temperatures, the quenching of the observed depolarization is consistent with a model in which the muon captures and loses electrons repeatedly, forming a succession of

20. Nuclear Physics and Nuclear Chemistry

AD-606 149 Div. 20
OTS Prices: HC $6.00/MF $1.25

Pennsylvania Univ., Philadelphia.
STUDIES IN PHOTONUCLEAR REACTIONS.
Annual rept.
Jun 60, 246p
Contract AF49 638 454
AFOSR TN60 889; AD 239 360

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Photonuclear reactions, Betatrons), (*Betatrons, Calibration), (*Electrons, Inelastic scattering), Neutron cross sections, Photons, Deuterium, Bismuth, Carbon, Oxygen.

Research progress in the following fields is reported: neutron separation energies and betatron energy calibration; phtotactivation studies of carbon and oxygen; inelastic scattering of electrons from nuclei.

AD-606 161 Div. 20
OTS Prices: HC $2.00/MF $0.50

California Univ., Los Angeles.
VARIABLE ENERGY EXTRACTION FROM THE UCLA 50 MeV CYCLOTRON.
Technical rept.,
by A. C. Paul and B. T. Wright. Dec 63, 36p P-66
Contract Nonr233 44

Unclassified report

Descriptors: (*Proton beams, Cyclotrons), (*Cyclotrons, Proton beams), Hydrogen, Ions, Foils, Magnets, Particle trajectories, Feasibility studies.

A scheme for the extraction of a 25 to 47 MeV proton beam into a common external beam-transport system was studied for use with the UCLA 50 MeV cyclotron. The extraction is accomplished by stripping negative hydrogen ions with a thin foil. The magnetic field is held constant while the radius and azimuth of the stripping foil are chosen so that the trajectories for any energy cross at a common point outside the cyclotron vacuum tank. A small combination magnet placed at this crossover point bends the trajectories into a common beam-transport system. The feasibility of this scheme was studied by computing the ion-optic matrix for the cyclotron fringing field for 25, 30, 35, 40 and 45 MeV. The beamspot size calculated indicates a one hundred per cent extraction efficiency in this energy range. (Author)

AD-606 253 Div. 20, 30, 31
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
RECENT APPLICATIONS OF RADIOISOTOPES,
by Leonard B. Gardner. 24 Aug 64, 13p
Proj. Y F015 12 04 406
NCEL N606

Unclassified report

Descriptors: (*Radioactive isotopes, Instrumentation), Measurement, Soils, Density, Moisture, Snow, Thickness, Scientific research.

This Technical Note summarizes applications found during a literature search which are suitable for Naval use. Prime emphasis has been placed on determining those applications suitable for field applications. Secondary consideration is given to research applications. Specifically excluded from this report is the application of radioisotopes to space heating. During the literature search, applications were sought which would reduce costs, improve efficiency and quality control, and open new fields for the Naval Shore Establishment. (Author)

AD-606 256 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONFERENCE OF THE ACTION OF IRRADIATION ON A SUBSTANCE, DUBNA, MAR 62,
by N. F. Pravdyuk, Yu. N. Pokrovskii, and P. A. Platonov. 19 Jul 63, 9p
FTD MT63 71; TT 64 71456

Unclassified report

Machine trans. of Atomnaya Energiya (USSR) 1962, v. 13, no. 6, p. 608-609.

Descriptors: (*Radiation damage, Symposia), Reactor Materials, Metals, Semiconductors, USSR.

AD-606 268 Div. 20, 2, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RANDOM FUNCTIONS OF COSMIC-RAY CASCADES,
by T. E. Harris. 7 Feb 57, 11p P-1020

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cosmic ray bursts, Statistical functions), Photons, Electrons, Bremsstrahlung, Probability, Statistical processes.

The usual model for the soft component of cosmic radiation, appropriate to the assumption of complete screening, is studied. First treating the case where collision loss is neglected, the expected values for the number of electrons and photons are related to the probability distribution of a certain nonmultiplicative Markov process, limit-theorems for this process having an interpretation in terms of the original multiplicative process. The total energy in all electrons is shown to converge in probability to a positive constant. If collision loss is included, certain peculiarities are pointed out in the fluctuations of the number of electrons. (Author)

AD-606 374 Div. 20, 7
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET ATOMIC POWER PROGRAM: LARGE OR SMALL,
by Arnold Kramish. 1 May 1957, 9p P-1076

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear power plants, USSR), (*USSR, Nuclear power plants), Electric power production, Thermoelectricity, Nuclear reactors, Turbines.

AD-606 696 Div. 20, 17
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
IN-DEPTH EMBRITTLEMENT TO A SIMULATED PRESSURE VESSEL WALL OF A302-B STEEL,
by C. Z. Serpan, Jr. and L. E. Steele. 4 Sep 64, 22p
Contract AT49 5 2110, Projs. RR007 01 46 5409, SR007 01 01, Task 0858
NRL 6151

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Reactor system components), (*Reactor materials, Steel), (*Steel, Brittleness), (*Radiation damage, Reactor materials), Ductility, Power reactors, Transition temperature, Thickness, Manganese alloys, Nickel alloys, Chrominum alloys, Molybdenum alloys.

Because of the self shielding and attenuation properties of the vessel material, a nuclear reactor pressure vessel will have a neutron flux and spectrum variation across its thickness. As a result of this variation, a pressure vessel should show various degrees of neutron-induced embrittlement throughout its thickness, and it is postulated that the embrittlement will be greatest at the inner wall and least at the outer wall. This phenomenon has been investigated by the irradiation of a large block of A302-B steel at the core face of a pool reactor in a position simulating the location of an actual pressure vessel. The steel block, 6 in. thick, was made to accommodate five equally spaced assemblies of Charpy V-notch specimens which, in turn, represented the vessel material at comparable positions. The notch ductility test results of the irradiated specimens demonstrate a significant degree of embrittlement as well as a significant decrease in the degree of embrittlement through the simulated pressure vessel wall. However, the observed decrease is small when related to the respective variation in neutron dosage. A correlation of the notch ductility data developed in this study to that between test reactor experiments and in-service power reactor conditions is indicated. (Author)

AD-606 712 Div. 20, 2
OTS Prices: HC $6.00/MF $2.00

Isotopes, Inc., Westwood, N. J.
PROJECT STAR DUST.
Quarterly rept. no. 9,
by Herbert W. Feely, Ben Davidson, James P. Friend, Raymond J. Lagomarsino, and Micah W. M. Leo. 1 Sep 63, 429p
Contract DA49 146XZ079
DASA 1309

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radioactive fallout, Mathematical models), (*Radiological contamination, Stratosphere), (*Stratosphere, Radiological contamination), Aerosols, Air pollution, Nuclear explosions, Radioactive isotopes, Strontium, Barium, Antimony, Beryllium, Manganese, Iron, Tropopause, Cosmic rays, Atmosphere models, Carbon dioxide, Soils.

Work which was done on Project Star Dust during the preceding contract year is reviewed. Filter samples of stratospheric radioactivity were collected using WU-2, RB-57 and RB-52 aircraft. Lower altitude collections included intensive sampling in the vicinity of extrusions of stratospheric air into the troposphere during the spring of 1963. A number of radiochemical and radiometric procedures used during Project Star Dust and developed since the issuance of the final report on Project HASP are described. (Author)

AD-606 766 Div. 20
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE SOVIET UNION AND THE ATOM: TOWARD NUCLEAR MATURITY,
by Arnold Kramish. 25 Apr 58, 116p RM-2163

Unclassified report

Rept. on Proj. Rand.

Descriptors: (*Nuclear energy, USSR), (*USSR, Nuclear energy), Nuclear engineering, Nuclear power plants, Nuclear reactors, Nuclear physics laboratories, Nuclear industrial applications, Nuclear weapons, Nuclear bombs, Nuclear explosions, Cyclotrons, Nuclear propulsion, Radioactive isotopes, Uranium, Linear accelerators, Synchrotrons, Thermonuclear reactions.

The Soviet Union has never issued formal periodic reports as do all western governments on the organization and progress of the atomic energy program. Even though in the west the military aspects of atomic energy are still classified, reports are available which give at least the organizational structure, the institutes, and the sites involved in weapons research and development. It is consequently with the greatest of difficulty that information on the Soviet program can be obtained. That which is presented here must be considered extremely sketchy, and, in the interests of accuracy, no speculative reports have been referenced. While this paper does not presume to be the Soviet counterpart of the 'Smyth Report,' it is believed that this final section of 'The Soviet Union and the Atom' presents close to the maximum amount of general descriptive information which can be combed from publicly available materials on the USSR atomic energy program.

AD-606 773 Div. 20, 17
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.
IN-REACTOR STUDIES OF LOW CYCLE FATIGUE PROPERTIES OF A NUCLEAR PRESSURE VESSEL STEEL.
Final rept.,
by J. R. Hawthorne and D. E. Steele. 27 Jul 64, 30p
Contract AT 49 5 2110, Projs. RR007 01 46 5409, SR007 01 01, Task 0858
NRL 612 7

Unclassified report

Prepared in cooperation with the Navy Bureau of Ships and the U. S. Steel Corp.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Reactor system components), (*Reactor materials, Steel), (*Steel, Reactor materials), (*Radiation damage, Steel), (*Fatigue (Mechanics), Reactor materials), Heat treatment, Manganese alloys, Nickel alloys, Chromium alloys, Molybdenum alloys, Metal plates, Power reactors, Test equipment.

An experimental irradiation assembly and associated instrumentation which have been developed and successfully utilized for the performance of dynamic in-reactor low cycle fatigue tests of reactor pressure vessel steels are described. The equipment provides for the simultaneous reverse bend testing of as many as fifteen sheet type specimens representing a range of strain amplitudes at controlled temperatures in the range 300 to 700F. The results of an exploratory investigation on the fatigue resistance of ASTM type A302-B steel during irradiation at 500F are presented and compared with data from out-of-reactor control tests. These preliminary data do not indicate any pronounced difference in the fatigue strength of irradiated versus unirradiated steel. Exploratory investigations are continuing. (Author)

briefly bound muonium atoms. In some of the semiconductors at low temperatures, as well as in other samples, a large fraction of the depolarization is quenched by a field of 100 G. This is seen as evidence for another depolarization mechanism. (Author)

AD-606 548 Div. 20, 12
OTS Prices: HC $3.00/MF $0.75

Boeing Co., Seattle, Wash.
ANALYSIS OF SOLAR-FLARE HAZARD TO MANNED SPACE SYSTEMS,
by E. L. Chupp, D. L. Dye, B. W. Mar, L. A. Oncley, and R. W. Williams. 1961, 83p D2-11608
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solar flares, Manned spacecraft), (*Manned spacecraft, Solar radiation), (*Radiation hazards, Solar flares), Space environmental conditions, Radiation effects, Protons, Dose rate, Radiobiology, Sunspots, Nuclear particles, Particle size, Lethal dosage, Shielding, Measurement, Probability, Statistical analysis.

An evaluation of the solar-flare proton radiation hazard is presented. By a detailed analysis of all available rocket, balloon, and riometer data for solar-flare proton events from February 1956 to September 1960 an estimate is made of the total proton flux and a power law differential spectrum is estimated for each event. Brief consideration of radiobiological effects of the non-uniform dose distributions resulting from flare proton spectra leads to the assignment of the absorbed dose at 4-centimeter depth in tissue as representative of the medically significant dose for flare events. A typical space vehicle design is analyzed for its solar-flare proton shielding effectiveness, and a factor of three to ten reduction in dose is found. It is concluded that the probability of encountering a dangerous dose level in the course of a week's space flight is comparable to, or less than, the probability of a fatal accident in a week of flying in an operational military aircraft. Use of a solar-flare proton event prediction criterion will reduce the hazard by a factor of three for a short mission; the use of a small amount of extra shielding will reduce the dose encountered by a further factor of up to ten.

AD-606 605 Div. 20, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A LINEAR PROGRAMMING MODEL OF THE GASEOUS-DIFFUSION ISOTOPE-SEPARATION PROCESS,
by Donald Fort. 12 Dec 57, 26p P-1231
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Isotope separation, Linear programming), (*Gaseous diffusion separation, Linear programming), (*Linear programming, Gaseous diffusion separation), Nuclear reactors, Reactor fuels, Uranium, Purification.

The purpose of the paper is to show how the gaseous diffusion process for separating uranium isotopes may be treated as a linear programming model. The model is developed by the theoretical or engineering approach, as opposed to empirical methods based on statistical analysis of observations. The model may be useful in the economic analysis of complicated systems involving various feedbacks between gaseous diffusion plant, neclear reactors, and other facilities involved in the production of nuclear materials and nuclear power. The paper is in three parts. First is a brief description of the physical separation process. Next it is shown how the physical relationships may be translated into linear programming terms. Finally it is briefly indicated how the linear programming model of the gaseous diffusion separation process may enter into larger models of the nuclear materials and power industry. (Author)

AD-606 615 Div. 20
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND NEUTRON TRANSPORT THEORY. II: FUNCTIONAL EQUATIONS,
by Richard Bellman, Robert Kalaba, and G. Milton Wing. Rev. 5 Mar 58, 32p P-1252
Unclassified report

Prepared in cooperation with the Atomic Energy Commission.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-606 431.

Descriptors: (*Neutron transport theory, Nonlinear differential equations), (*Fission products, Neutron transport theory), Boundary value problems, Probability, Equations, Functions, Invariance, Critical assemblies, Neutron flux, Mathematical models.

Some one-dimensional fission processes are considered with particular regard to questions of critical length and energy dependence of the products of fission. Various interconnections between the functions used in the invariant imbedding approach and the classical approach are indicated. In particular it is shown how one may pass from the consideration of certain linear two-point boundary value problems to nonlinear (Riccation type) initial value problems. The former are useful for theoretical considerations, the latter for numerical computation. (Author)

AD-606 674 Div. 20
OTS Prices: HC $3.00/MF $0.75

General Dynamics/Fort Worth, Tex.
NUCLEAR-INDUCED AIR-IONIZATION CURRENTS,
by P. R. Cheever. 31 Mar 64, 70p
NARF-63-16T, FZK-9-190
Contract AF33 657 7201
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiation damage, Electrodes), (*Gas ionization, Radiation damage), (*Ionization chambers, Ionic currents), Cobalt, Electric fields, Pressure, Voltage, Nitrogen, Experimental data, Tests, Analysis, Nuclear physics laboratories.

The results of an analytical and an experimental investigation of ionization currents for pairs of parallel cylindrical electrodes subjected to 200,000 r/hr of cobalt-60 radiation are compared. Two electric-field assumptions were used to derive two ionization-current equations. Fair agreement was achieved between measured and calculated values. The effects of pressure, voltage, electrode diameter, and electrode separation are illustrated in numerous ionization curves. (Author)

22. Ordnance

AD-606 160 Div. 22, 9, 30
OTS Prices: HC $1.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
A COMPUTER PROGRAM TO DETERMINE DRAG COEFFICIENTS FROM RANGE TABLE DATA,
Technical memo.,
by Lorraine S. Paladino. Sep 64, 20p
NWL K-57/64

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Projectiles, Drag), (*Drag, Programming (Computers)), (*Programming (Computers), Drag), Range tables, Ballistics, Mathematical models, Mathematical analysis, Statistical data, Projectile trajectories.

A description, including a flow diagram and FORTRAN IV listing, is given for a program designed to determine drag coefficients and corresponding Mach numbers of a weapon from range table position and velocity data. (Author)

AD-606 335 Div. 22, 24
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
APPLICATION OF A DISCRETE LINE EMISSION SOURCE TO DAYLIGHT BALLISTIC PHOTOGRAPHY,
by D. S. Webber and R. A. Satten. 9 May 58, 23p
STL/GM-TR-0165-00381

Unclassified report

Prepared in cooperation with California Univ., Los Angeles.

Descriptors: (*Ballistic cameras, Design), (*Photoflash cartridges, Ballistic cameras), (*Line spectrum, Potassium), Light, Excitation, Heat of activation, Dissociation, Potassium compounds, Magnesium compounds, Aluminum compounds, Halogen compounds, Intensity, Photographic filters, Narrowband, Guided missiles, Tests, Ballistics, Photography.

On the basis of long-range ballistic missile testing requirements, criteria are presented for an operational daylight capability for ballistic cameras. It is shown that these criteria can be met with present camera equipment, narrow band interference filters, and improved photoflash cartridges. The necessary improvement of the cartridges consists of increasing the output in the potassium resonance lines of the standard 'Daisy' photoflash cartridge by a factor of about six. Theoretical considerations and experimental data are presented which indicate that such improvement is quite feasible. Recommendations are made for a program to achieve the improvement of the light source and to develop the necessary techniques for a complete ballistic camera daylight capability. (Author)

AD-606 588 Div. 22, 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE INTENSE STRESS FIELD PRODUCED IN THE ELASTIC EARTH BY A BOMB BLAST AT THE SURFACE,
by Hyman Serbin. 23 Aug 57, 32p P-1210

Unclassified report

Submitted to the Journal of Seismology.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Surface burst, Shock waves), (*Shock waves, Stresses), (*Elasticity, Shock waves), Earth, Structures, Blast, Air burst, Mathematical models, Equations, Mathematical analysis, Functions, Velocity, Pressure, Theory.

A theory for the free stress field in the earth developed by a bomb blast at the surface is presented. The theory is based on the assumption that the earth is an elastic solid. The analysis is confined to the intense stress field developed shortly after the burst. Stresses and displacements are calculated in explicit form and can be compared with test data when such is available. (Author)

AD-606 663 Div. 22
OTS Prices: HC $4.00/MF $0.75

Watervliet Arsenal, N. Y.
BORE EVACUATOR VALVE TEST, CANNON 155MM HOWITZER, M126.
Technical rept.,
by J. M. Giesey, E. R. Lawson, and R. L. Rosenblum.
Aug 64, 104p
WVT II6412

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Howitzers, Valves), (*High-pressure valves, Gun barrels), (*Firing tests (Ordnance), Howitzers), Test methods, Strain (Mechanics), Strain gages, Design, Life expectancy, Performance (Engineering), Pressure, Stresses, Gun components.

The limited life of Bore Evacuator Valve Assembly 8769384 during firing tests led to the authorization of a test program to find a valve assembly with a longer life. The cost of testing in the gun (155mm How. M126) made it economical to build a test apparatus which simulated the weapon. The test program was the basis for the incorporation of valve assembly 8769531 into the weapon system. A comparison of the strain level of the modification is presented. The life of the then current production valve assembly and the new production valve assembly under different charges is also given. (Author)

21. Nuclear Propulsion

AD-606 336 Div. 21, 12, 27
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THRUST OPTIMIZATION OF A NUCLEAR ROCKET OF VARIABLE SPECIFIC IMPULSE,
by H. R. Lawrence, C. J. Wang, and G. W. Anthony.
29 May 58, 25p

Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Rocket propulsion, Nuclear propulsion), (*Nuclear propulsion, Thrust), (*Thrust, Nuclear propulsion), Nuclear reactors, Specific impulse, Gas flow, Dissociation, Velocity, Spacecraft, Rocket propellants, Mathematical analysis.

A simple relation is derived between the specific impulse and the flow rate of a gas under the reactor operating conditions allowing molecular dissociation of the gas. Utilizing this relation, an optimum variable thrust program to maximize velocity is obtained for a vertically ascending vehicle under the assumptions of constant gravity and zero aerodynamic drag. The advantage of this program is demonstrated by comparison with the usual constant thrust program. (Author)

24. Photography and Other Reproduction Processes

AD-606 522 Div. 24, 2
OTS Prices: HC $1.00/MF $0.50

Lick Observatory, Mount Hamilton, Calif.
ELECTRONOGRAPHIC IMAGE TUBES FOR ASTRONOMY.
Rept. for 1 Oct 63-30 Sep 64,
by Gerald E. Kron. 1 Oct 64, 4p
Contract Nonr2892 01
Unclassified report

Descriptors: (*Image tubes, Electrophotography), (*Astronomical cameras, Image tubes), Performance (Engineering), Photocathodes, Distortion, Photographic emulsions, Resolution, Moon, Stars, Telescopes, Storage tubes.

Progress is reported on a series of experimental trials in an attempt to make an electronographic type of image tube, or electronic camera, of our design and construction, yield astronomical pictures containing information that cannot be recorded by photographic methods. The performance of the image tube is studied and changes made in its construction and operation to improve its performance.

AD-606 694 Div. 24, 6, 8
OTS Prices: HC $4.00/MF $0.75

General Precision, Inc., Glendale, Calif.
STEREOPLOTTER, PROJECTION AP-14().
Final rept. for 10 Dec 62-15 Sep 63,
by F. M. Salomon. Apr 64, 104p
Contract AF30 602 1771
RADC TDR64 154 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stereoscopic map plotters, Design), (*Stereoscopic projectors, Stereoscopic map plotters), Mapping, Scanning, Instrumentation, correlators, Cathode ray tubes, Plotting boards, Circuits, Automatic, Video signals, Photographic techniques, Servomechanisms, Operation.

The application of a raster servo system to the areas of contour detection and tracing is considered from both a theoretical and experimental point of view. The basic electronic systems required for such an instrumentation are considered in detail, and the limitations imposed by the existing instrumentation are discussed quantitatively. Experimental data, obtained with the aid of the prototype model constructed for this study, indicates that a raster servo contour tracing system provides a rapid and accurate means of extracting steremodel contour information. (Author)

AD-606 846 Div. 24, 22
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SIMPLE DEVICE FOR ASSESSING GUN-CAMERA FILM AGAINST BANNER TARGETS,
by J. L. Jenkins. 21 Feb 58, 8p P-1285
Unclassified report

To be published in 'Fighter Weapons Newsletter', Jun 58, USAF Fighter Weapons School, Nellis Air Force Base, Nevada.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerial gunnery, Photographic analysis), (*Aerial photography, Photographic analysis), Aerial cameras, Photographic analysis, Aerial targets, Tracking, Training devices.

23. Personnel and Training

AD-606 352 Div. 23, 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON THE SOCIOLOGY OF MANAGEMENT,
by David G. Hays. Rev. 11 Jul 57, 17p P1043
Unclassified report

Descriptors: (*Industrial relations, Automation), (*Sociology, Automation), (*Automation, Industrial relations), Management planning, Management control systems, Labor, Personnel, Theory.

Five functions of management are: planning, organizing, staffing, directing, and controlling. Managers perform these functions by manipulating the organizations which sociologists study; hence, the sociologist should be a useful aide to the manager. Automation raises problems which illustrate the relationship: problems of changing authority and career lines, and problems of human judgment. (Author)

AD-606 357 Div. 23, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ECONOMICS OF NAVY PAY,
by Alain C. Enthoven. 2 Apr 57, 19p P-1051
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wages, Naval personnel), (*Economics, Wages), Personnel management, Performance (Human), Attitudes.

The economic aspects of the navy pay structure are discussed with respect to longevity, morale, personnel performance, and retention of experienced personnel.

AD-606 481 Div. 23, 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IDEOLOGICAL AND ORGANIZATIONAL ACTIVITY OF MILITARY CADRES,
by R. Ya. Malinovskii. 9 Sep 64, 17p
FTD TT64 473; TT 64 71471
Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 53 (12269) 3 Mar, p. 2.

Descriptors: (*Officer personnel, USSR), (*Military training, Communists), Armed forces (Foreign), Military personnel, Communism, Propaganda, Education, Government (Foreign).

The discussion is aimed at improving the business and political qualities of military cadres, in order to enrich them with ideological experience and organizational work, with methods of fighting for the achievement of new boundaries in tactical and political training of military personnel. It is hoped that they will convert into life the policies of the Communist party in the field of military construction.

AD-606 625 Div. 23, 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
WHAT THE FACTORY WORKER KNOWS ABOUT HIS FACTORY,
by Donald R. Fagg, Carl Kaysen, and Roland N. McKean.
7 Feb 58, 62p P-1275
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Public opinion, Reliability), Factories, Personnel, Statistical data, Scattering, Management engineering, Decision making.

An attempt was made to measure the variability in the knowledge that workers have about their factory. The original purpose of the study was to learn more about the confidence that could be attached to information about one country's economy that often reaches another nation's hands. Refugees, for example, often bring with them scraps of information about their former situation, and clues to the reliability of such data are important. But the results of the study may be pertinent in many other connections. Businessmen may be interested in knowing whether or not employees ordinarily have accurate information about their company. They may wish to know whether or not reliable data can be obtained from a small sample of a firm's employees. The results may also be pertinent to the businessman's interpretation of any kind of poll or survey that seeks factual information (as contrasted with 'attitude surveys'). Finally, since it is sometimes necessary to form opinions and make decisions on the basis of the testimony of a few witnesses, the reports of a few observers, or the estimates of a few participants, recognition of the variability of any estimate, however derived, may be extremely important in decision-making.

AD-606 657 Div. 23, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPUTER TRAINING AND EDUCATION: THE PICTURE IN 1962,
by F. J. Gruenberger. Jul 62, 12p P-2597
Unclassified report

Prepared for presentation at the Northwest Computing Association Annual Meeting, Seattle, 9 Aug 62.

Descriptors: (*Computer personnel, Training), Education, Training devices, Universities, Reviews.

AD-606 734 Div. 23, 18, 32
OTS Prices: HC $2.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS, FY 1964,
by Emma E. Brown. Aug 64, 46p
Projs. 2J024701A721, 2J024701A722
APRO TRN 149
Unclassified report

Descriptors: (*Bibliographies, Military publications), (*Military publications, Bibliographies), (*Military personnel, Selection), Abstracting, Army research, Psychometrics, Performance tests, Libraries.

of glow discharge tubes. In the literature of this field these waves have been called 'moving striations' because of the visible radiation emanating from the traveling pulse. Both experimental and theoretical analyses of this phenomenon were made. The principal experimental result of this work is the establishment of a linear regime of operation for the observed traveling waves and the artificial excitation of them. The principal theoretical result is the derivation and the analysis of a linear theory that is applicable to the experimental regime of operation. (Author)

AD-606 225 Div. 25
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ON THE MECHANISM FOR INSTABILITY OF TRANSVERSE PLASMA WAVES,
by Burton D. Fried. 20 Feb 59, 7p
STL/TN-59-0000-00235
Contract AF04 647 309

Unclassified report

Descriptors: (*Plasma oscillations, Dynamics), (*Particle trajectories, Plasma physics), Electrons, Magnetic fields, Velocity, Distribution, Equations, Statistical functions.

A physical mechanism is presented for the growth of transverse plasma waves due to an anisotropic velocity distribution. It is shown that in absence of an external magnetic field, curvature of particle trajectories in the fluctuation magnetic field accounts quantitatively for the growth rate calculated from the Boltzmann equation. (Author)

AD-606 227 Div. 25, 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
ELASTIC BUCKLING OF TWO-LAYER CYLINDERS AND CURVED PLATES,
by W. Zophres. 31 Dec 58, 20p STL/GM-TR-0165-00539, STL-EM-8-27

Unclassified report

Descriptors: (*Buckling (Mechanics), Stiffened cylinders), (*Stiffened cylinders, Elasticity), Cylindrical bodies, Structural shells, Stresses, Stability, Equations, Reinforcing materials, Laminates, Aerospace craft.

It is shown that the Donnell equation of a thin cylindrical element composed of two well-bonded layers of different materials but which have equal Poisson ratios is identical in form to the single-layer equation except in the stiffness constants. It is possible then to utilize the results of single-layer buckling analyses for cylinders and curved plates by proper substitution of the bending and extensional stiffnesses of the two-layer wall for the corresponding stiffnesses of the single-layer wall. The case of the cylinder in axial compression is discussed in some detail. (Author)

AD-606 228 Div. 25
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
PLASTIC ANALYSIS OF PRESSURE VESSEL INSTABILITY,
by R. P. Felgar. Oct 60, 82p
STL/TR-60-0000-19319, STL-EM-10-24

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Pressure vessels, Stability), Deformation, Plasticity, Theory, Elasticity, Stresses, Strain (Mechanics), Analysis.

Plasticity theory is used as a basis for analyzing the instability of pressure vessels for various ratios of biaxial stresses. Methods of analysis are developed which incorporate the behavior of the material with various degrees of precision. The methods are illustrated using Ladish D6AC. The predicted instability pressures are compared with the measured values. For the most precise method of analysis, predicted and measured values agree with 31/2% or better. The instability strains have a somewhat wider discrepancy. The analysis can be used as a design procedure to give an upper limit on the burst pressure. (Author)

AD-606 230 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INTERACTION OF SLOW ELECTRONS WITH ATOMIC OXYGEN AND ATOMIC NITROGEN.
Aerophysics Operation Research memo,
by Milton M. Klein and Keith A. Brueckner. 11 Apr 58, 32p R58SD222, GE Aerophysics ORM-11
Contract AF04 645 24

Unclassified report

Descriptors: (*Oxygen, Ionization), (*Nitrogen, Ionization), (*Electrons, Polarization), Field theory, Photons, Air, Scattering, Atomic energy levels.

The polarization potential for an electron in the field of an oxygen atom was determined by utilizing recent experimental results on the binding energy of 0(-). The corresponding polarization potential for atomic nitrogen was obtained from the results for oxygen by an extrapolation based on the theory of polarization. From these results the photo cross section for 0(-) and the scattering cross section sections for oxygen and nitrogen were calculated. The photo cross section is in good agreement with experimental results. The scattering cross sections are compared with other recent calculations. It is also shown on the basis of the general theory of the photo cross section that the energy dependence of the cross section determines the scattering length for electron scattering. The agreement of the computed photo cross section with experiment therefore is a direct check on the scattering prediction. (Author)

AD-606 231 Div. 25, 15, 20
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING, PARTICLE INTERACTION AND CONSERVATION RELATIONS,
by Richard Bellman and Sherman Lehman. Sep 64, 24p RM-3816-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Quantum mechanics, Difference equations), Particles, Transport properties, Differential geometry, Partial differential equations, Nonlinear differential equations, Numerical analysis.

It is shown that for a quite general class of transport processes involving particle-particle interaction, as well as the usual particle-medium interaction, difference approximations can be obtained which exhibit nonnegativity and boundedness in an immediate fashion. Furthermore, a unifrom Lipschitz condition is preserved.

25. Physics

AD-606 163 Div. 25, 4
OTS Prices: HC $7.55/MF $2.00

National Bureau of Standards, Washington, D. C.
TABLES OF IDEAL GAS THERMODYNAMIC FUNCTIONS FOR 73 ATOMS AND THEIR FIRST AND SECOND IONS TO 10,000K,
by Joseph Hilsenrath, Carla G. Messina, and William H. Evans. Aug 64, 452p
Contract AF29 601 60 4491, Proj. 5776, Task 577601
WL TDR64 44
Unclassified report

Descriptors: (*Thermodynamics, Tables), (*Atomic properties, Thermodynamics), Ions, Electrons, Gases, Atomic energy levels, Quantum statistics, Specific heat, Entropy.

Tables are presented of five thermodynamic properties for the electron, for 73 elements, H through La and Hf through Ac (with the exception of At and Fr) and, in most cases, for their first and second ions. The tables are given at 100 degree intervals starting at 100K for the atoms and at 100 or 1000 degree for the ions and extending to 10,000K. They were computed for the atoms and atomic ions considered as ideal monatomic gases by direct summation over the available energy levels. The summation over energy levels was made from the ground state up to the principal quantum number 5. Where the quantum number, n, for the ground state exceeds 5, summations were made only over levels having the same n as the ground state. The sensitivity of the thermal functions to the inclusion of higher energy states in the partition function is discussed briefly, illustrated graphically for the specific heats, and tabulated for the Gibbs free energy function. (Author)

AD-606 186 Div. 25
OTS Prices: HC $5.00/MF $1.00

Electronics Research Lab., Univ. of California, Berkeley.
INSTABILITIES IN THE ELECTRON-HOLE PLASMAS IN SEMICONDUCTORS,
by S. Kakihana. 25 May 64, 176p ERL-64-19
Contract Nonr222 57
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Plasma physics), (*Plasma medium, Stability), Magnetic fields, Field theory, Electric fields, Polarization, Plasma oscillations, Mathematica models.

Contents: helical instability in electron-hole plasmas in semiconductors-'oscillistor' type oscillations; oscillations in the absence of magnetic field-modes of oscillations resembling two-stream instabilities in plasma.

AD-606 198 Div. 25, 1, 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BRIEF REVIEW OF MASS TRANSFER COOLING,
by James P. Hartnett. Jan 62, 31p P-2473
Unclassified report

Paper prepared for presentation at the 'Journees d'Etudes Internationales de la Transmission de la Chaleur' held in Paris during the week of 19 Jun 61.

Descriptors: (*Heat transfer, Cooling), (*Cooling, Transport properties), (*Transport properties, Cooling), Hypersonic flow, Fluid flow, Boundary layer, Gases, Porous materials, Film cooling, Laminar flow, Turbulent flow, Ablation, Evapotranspiration, Heat transfer, Aerodynamic heating.

The following cooling methods are discussed: Film cooling; Transpiration cooling; Liquid film cooling; Ablation cooling.

AD-606 219 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Microwave Lab., Stanford Univ., Calif.
PHOTOMIXING IN A BULK SEMICONDUCTOR PHOTODETECTOR.
Technical rept.,
by J. N. Weaver. Aug 64, 91p ML-1206
Contract Nonr225 48, Grant NSF G22929, Proj. NR373 361
Unclassified report

Supported in part by the U. S. Army Signal Corps and U. S. Air Force.

Descriptors: (*Light, Demodulation), (*Demodulators, Light), (*Semiconductor devices, Crystal mixers), (*Photoelectric cells (Semiconductor), Photoconductivity), Single crystals, Lasers, Microwave frequency, Photoelectric effect, Electrical properties, Voltage, Electric currents, Theory, Mathematical analysis, Experimental data, Design, Cadmium alloys, Selenium alloys, Silicon, Gallium alloys, Arsenic alloys.

This study is concerned with bulk semiconductors as detectors of the difference frequency between two or more optical signals and as a demodulator of microwave AM modulated light. The basic experiment consisted of mounting single crystals of CdSe, Si, and GaAs in a coaxial mount and illuminating the crystals with the beam of single laser. A dc bias voltage was applied and the microwave and dc photocurrents were measured as a function of light intensity, bias voltage, temperature, microwave match, and the various crystal samples. Some of the experimental problems encountered are discussed. An outline of the pertinent, simplified photoconductor theory is presented along with an equivalent circuit for the photodetector device. Also, the semiconductor capture cross section, lifetime, and trap density is calculated from the measured values of photocurrent. The bulk semiconductor photodetector is shown to be a rugged, simple, and inexpensive device for detecting optical beat frequencies, particularly at high light levels and in the infrared. (Author)

AD-606 220 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
TRAVELING DENSITY VARIATIONS IN PARTIALLY IONIZED GASES.
Doctoral thesis,
by Robert Shanklin Cooper. 2 Sep 64, 86p RLE-424
Contract DA36 039AMC03200E, Grant DA SIG36 039 61G14
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Plasma medium, Density), (*Glow discharges, Plasma oscillations), Gas ionization, Discharge tubes, Mechanical waves, Damping, Traveling-wave tubes.

The report deals with the problem of the propagation of macroscopic waves of ionization within the positive column

AD-606 323 Div. 25, 8
OTS Prices: HC $5.00/MF $1.25

Conductron Corp., Ann Arbor, Mich.
COHERENT LIGHT INVESTIGATION. VOLUME I,
by G. Cochran, L. Cutrona, A. Ingalls, I. Kay, and J. Newburn. Mar 64, 197p Conductron-D-5210-70-T80-110
Contract AF33 615 1014

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Light, Electromagnetic properties), (*Lasers, Radar), (*Radar, Lasers), Wave transmission, Quantum mechanics, Masers, Functions, Microwaves, Optics, Antenna radiation patterns, Electromagnetic waves, Propagation.

Contents: Fundamental considerations of electromagnetic radiation, transfer functions, the propagation of light in an inhomogeneous isotropic medium, comparison of microwave and optical radars, use of a laser in optical measurements, far field antenna pattern prediction from near field measurements, summary and future work.

AD-606 333 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
EFFECTS OF A MAGNETIC FIELD ON THE HYPERVELOCITY FLOW ABOUT A BLUNT BODY,
by Richard W. Ziemer. 27 Aug 58, 29p
STL/GM-TR-0165-00464
Contract AF04 647 165

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hypersonic flow, Magnetohydrodynamics), (*Magnetohydrodynamics, Hypersonic flow), (*Blunt bodies, Magnetohydrodynamics), Magnetic fields, Ionization, Gas flow, Shock waves, Shock tubes, Theory, Experimental data, Mathematical analysis.

An experimental investigation was made of the effect of an applied magnetic field on the bow shock of a blunt body in hypervelocity air flow. Quantitative measurements of the stand-off distance were made in a three-inch electromagnetic shock tube with free-stream velocities up to 22,000 feet per second. The test body was a hemispherical cylinder containing a coaxial pulsed magnet coil in the nose which produced field strengths at the stagnation point of up to 40 kilogauss. The application of the magnetic field displaced the bow shock upstream and the stand-off distance increased by a factor of 7.5 for the condition, nondimensional parameter = 69. The experimental results were compared with theory and good agreement was obtained within the range of experimental conditions. (Author)

AD-606 342 Div. 25, 14, 17
OTS Prices: HC $4.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SURVEY OF SPALLATION LITERATURE,
by Z. Rieder. Nov 59, 111p
Contract AF29 601 1777, Proj. 5776
AFSWC SWR TM60 3

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bibliographies, Fracture (Mechanics), (*Fracture (Mechanics), Bibliographies), Abstracts, Aging (Materials), Materials, Brittleness, Metals, Mechanical properties, Shock waves, Loading (Mechanics), Stresses, Mathematical analysis, Steel, Glass, Plastics, Impact shock, Metal plates, Crystals, Crystal lattice defects, Solids, Refractory metals, Aluminum.

This literature survey of pertinent available data on the theory and mechanism of spallation is concerned primarily with the mechanism of fracture and associated effects. The study reviews discussions of relatively long-time loadings and includes descriptions of experiments on fully brittle materials, such as glass, which were later duplicated on metals. (Author)

AD-606 344 Div. 25, 30
OTS Prices: HC $2.00/MF $0.50

Lockheed Missile and Space Co., Sunnyvale, Calif.
THERMAL STRESS ANALYSIS BY ENERGY METHODS,
by Louis A. Riedinger. Jun 58, 37p LMSC-3123-R1
PB 156 213

Unclassified report

The original paper was presented at the ARDC high speed symposium at the Univ. of Florida, Jan 57.

Descriptors: (*Thermal stresses, Mathematical analysis), Structures, Thermal expansion, Load distribution, Flat plate models, Energy, Equations.

An energy analysis is used to obtain thermal stresses in a structure subjected to temperature variation. After structural idealization--the application of redundants between the specified adjacent structural elements--the temperature of each element is applied. With the redundants missing, each element freely expands; however, the confinements generating thermal stress are calculated by use of Castigliano's minimal energy theorem and with the aid of a digital computer. Temperature stresses due to dissimilar materials are also calculated by this method. Various materials are combined in an attempt to reduce the thermal stress. In particular the alpha delta T product of the various members is studied. (Author)

AD-606 395 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
MAGNETOHYDRODYNAMIC AND PLASMA TURBULENCE,
by Leslie S. G. Kovasznay. Sep 64, 27p JHU-23-P
Contract Nonr3623 00, Proj. NR098 038

Unclassified report

Rept. on Proj. Squid. Prepared in cooperation with the Virginia Univ., Charlottesville. Paper presented at the International Congress of Applied Mechanics (no. 11), Munich, 30 Aug-5 Sep 64.

Descriptors: (*Magnetohydrodynamics, Turbulence), (*Plasma medium, Turbulence), Wake, Chemical reactions, Electrostatics, Electrical conductance, Reviews.

A review of the development in turbulence of electrically conducting media is given for the last 4-5 years. Theories of homogeneous turbulence both 'passive' and 'active' are summarized. The 'chemical' approach in hot wakes is also reviewed. The possibility of electrostatic turbulence completes the review. (Author)

AD-606 237 Div. 25, 12, 15,
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
ON THE DETERMINATION OF STRESSES AND DISPLACEMENTS FOR UNSYMMETRICAL DEFORMATION OF SHALLOW SPHERICAL SHELLS,
by Eric Reissner. 16 Sep 57, 36p GM-TR-245, EM-7-14
Contract AF18 600 1190

Unclassified report

Descriptors: (*Elastic shells, Deformation), (*Stresses, Elastic shells), Elasticity, Structural shells, Spheres, Deflection, Moments, Mathematical analysis, Boundary value problems, Differential equations, Simultaneous equations, Integration, Differential geometry.

The report is concerned with problems of bending of thin, elastic, shallow spherical shells of uniform thickness. Explicit expressions are derived, in terms of stress function and axial displacement component, for radial and circumferential displacement components. It is shown that certain uni-valued portions of the solution for stress function and axial displacement components give rise to multi-valued expressions for radial and circumferential displacement components. A new type of solution of the differential equations is derived which is multi-valued insofar as the stress function is concerned but gives uni-valued expressions for all quantities which should be uni-valued. It is shown that this type of solution is needed for the analysis of problems for which a resultant side force is acting along the edge of a symmetrical circular boundary of the shell. The nature and form of this side-force solution differs in important respects from the corresponding known solution for the case of a flat plate. No direct transition is possible from the shell solution to the corresponding flat-plate solution. As a specific application, a shell is considered which is supported at its outer edge and which has a small symmetrical rigid insert.

AD-606 249 Div. 25, 9, 20, 30
OTS Prices: HC $4.00/MF $0.75

Republic Aviation Corp., Farmingdale, N. Y.
SIMULATION AND PROTOTYPE CONSTRUCTION. PROJECT CANTALOUPE.
Final rept.,
by L. Kraus. Aug 64, 109p
Contract AF29 601 2866, Proj. 7811, Task 781102
RTD TDR63 3097

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma physics, Boundary value problems), (*Magnetohydrodynamics, Magnetic pinch), Magnetic fields, Electric fields, Surface properties, Oscillation, Ionization, Electrical conductance, Viscosity, Test equipment, Nuclear explosions, Simulation, Fluid mechanics.

A theta-pinch apparatus specifically designed for the purpose has been used to study Rayleigh-Taylor instabilities at a plasma-magnetic field interface. Special features include preionization, a pulse-shaping network, and a provision for transverse as well as axial photography. A constant magnetic field results in a constant velocity radial compression, in good agreement with 'snowplow' theory. In this case, as expected, no surface instabilities are observed. A sinusoidal compression field, however, results in instabilities whose wavelength and growth rate are measured. Theoretical dispersion relations for finite electrical conductivity and for finite viscosity are derived. In addition, the mode of maximum instability is determined. These relations are compared with the experimental results. The observed wavelength (assumed to be the wavelength of maximum instability) and its growth rate are in agreement with the assumption that the effect of viscosity must be retained in the dispersion relation. The dispersion relation in the present case is independent of the electrical conductivity. While previous investigators have attempted to correlate observed wavelengths with finite electrical conductivity, this is shown here to be unwarranted. (Author)

AD-606 290 Div. 25, 6, 12
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
SCATTERING OF ELECTROMAGNETIC WAVES FROM THE DISTURBANCE CAUSED BY A RAPIDLY MOVING BODY IN PLASMAS,
by Suc Kyuen Suh. Aug 64, 31p BrownEng-R-111
Contract DA01 021AMC85Z

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Electromagnetic waves, Scattering), (*Plasma medium, Scattering), Reentry vehicles, Wake, Atmosphere entry, Aerodynamic heating, Ionosphere, Radar echo areas, Electron density, Kinetic theory, Vector analysis, Turbulence.

The scattering of electromagnetic waves by a body moving in a plasma is discussed in detail. General theory covering scattering phenomena is developed with emphasis on a perturbation method which can be used to obtain reasonably accurate differential cross section under two different physical conditions. The general theory is extended to investigate the following two problems: the scattering of electromagnetic waves from the disturbance caused by a rapidly moving body in the ionosphere and the scattering of electromagnetic waves from the turbulent wake produced by a re-entry vehicle. In the first problem, kinetic equations are used to find the frequency spectrum of the electron density fluctuations in terms of which the differential scattering cross-section can be expressed. In the second problem the differential scattering cross-section is obtained in terms of the correlation function for turbulence, which can be estimated by using the correlation length. (Author)

AD-606 315 Div. 25
OTS Prices: HC $2.00/MF $0.50

Case Inst. of Tech., Cleveland, Ohio.
PRESSURE DERIVATIVES OF THE ELASTIC CONSTANTS OF NaCl AND KCl AT 295K AND 195K.
Technical rept. no. 8,
by Richard A. Bartels. Aug 64, 49p
Contract Nonr1141 05, Proj. NR017 309

Unclassified report

Report on Solid State Physics Program.

Descriptors: (*Sodium compounds, Chlorides), (*Potassium compounds, Chlorides), (*Crystals, Elasticity), Crystal lattices, Vibration, Ultrasonic radiation, Pressure, Temperature, Equations of state.

The pressure derivatives of the adiabatic elastic constants of NaCl and KCl were measured at 295K and 195K using the ultrasonic pulse-echo technique. The results were used to calculate mode gammas. These were found to have no strong temperature dependence. The mode gammas were suitably averaged to obtain values of Gruneisen's parameter which agree satisfactorially with those found from the Mie-Gruneisen equation of state.

AD-606 480 Div. 25, 8, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF THE PROPERTIES OF A POLYMER-SEMICONDUCTOR INTERFACE,
by G. A. Sokolina, N. A. Krotova, and Yu. A. Khrustalev. 9 Sep 64, 12p
FTD TT64 467; TT 64 71470

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1962, v. 147, no. 6, p. 1409-1412.

Descriptors: (*Polymers, Adhesion), (*Plastic coatings, Adhesion), (*Semiconductors, Plastic coatings), Germanium, Surface properties, Electrical conductance Electric fields, Electron transitions, Vinyl plastics, Acrylic resins, Chemisorption, USSR.

Investigation of the surface, polymer-semiconductor interface, by the 'field effect' method was found to have practical value for rational selection of lacquers used for covering semiconductor instruments. Experiments performed with some commercial lacquers show that their application to the surface of a semiconductor leads to considerable change in the state of the surface, changing its charge and introducing a great number of surface states. (Author)

AD-606 483 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF GROWING MONOCRYSTALS,
by G. A. Kurov, V. D. Vasil'ev, and M. G. Kosaganova. 9 Sep 64, 6p
FTD TT64 476; TT 64 71473

Unclassified report

Unedited rough draft trans. of Russian patent 152741 (appl. 750908/22, 9 Nov 61).

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Single crystals), Films, Crystals, Vaporization, Vacuum apparatus, Recrystallization.

A method is described for growing monocrystals in the form of thin films. The original material is made to vaporize in a vacuum through a sieve onto a base with subsequent recrystallization.

AD-606 506 Div. 25, 17
OTS Prices: HC $3.00/MF $0.75

South Dakota School of Mines and Technology, Rapid City.
THE THERMAL CONDUCTIVITY AND SEEBECK COEFFICIENT OF SOME CUBIC SODIUM TUNGSTEN BRONZES.
Technical rept. no. 12 (Master's thesis),
by Howard R. Shanks. 1 Sep 64, 67p
Contract Nonr2964 01, Proj. NR017 208

Unclassified report

Rept. on Solid State Physics Proj.

Descriptors: (*Bronze, Thermal conductivity), (*Thermal conductivity, Bronze), (*Thermoelectricity, Bronze), Sodium alloys, Tungsten alloys, Measurement, Differential equations, Chromium alloys, Nickel alloys, Aluminium alloys, Thermocouples, Test methods, Transition temperature, Experimental data.

The thermal conductivity and Seebeck coefficient of two cubic sodium tungsten bronze samples (NaxW03) with x-values of 0.513 and 0.804 were measured in the temperature range of 350 to 700K. The thermal conductivity measurements were made using a series comparative method with Armco iron as the standard. The Seebeck coefficients were calculated from the measured Seebeck voltages of the bronze samples with respect to Chromel and Alumel and the known Seebeck coefficients of Chromel and Alumel. The thermal conductivities of both samples were found to increase with increasing temperature with a discontinuity between 400 and 500K. The positive temperature coefficients were interpreted as a combination of electron and phonon conduction both limited by impurity scattering. The discontinuity was interpreted as a disordering of the sodium atoms.

AD-606 512 Div. 25
OTS Prices: HC $4.00/MF $1.00

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS.
Research rept.,
by L. B. Felsen and N. Marcuvitz. 22 May 64, 128p PIBMRI-1225-64
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 64 557

Unclassified report

Descriptors: (*Electromagnetic fields, Synthesis), (*Transmission lines, Equations), Numerical analysis, Green's function, Geometry, Optics, Propagation, Waveguides, Dielectric properties, Electromagnetic waves, Electromagnetism.

Contents: A - Approximate methods for solving the transmission line equations in variable media; radiation problems in plane stratified regions; the limit of geometrical optics.

AD-606 514 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DIAGNOSTICS OF PULSED PLASMAS AND ELECTRON BEAM-PLASMA INTERACTIONS.
Final rept. for Feb 63-Jan 64,
by Robert R. Pepper. 27 Apr 64, 23p PIBMRI-1208-64
Contract AF33 657 10820, Proj. 4156, Task 415604
AL TDR64 65

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Plasma medium, Analysis), (*Electron beams, Plasma physics), Microwave equipment, Interferometers, Electron density, Line spectrum, Plasma oscillations, Electric fields, Space charges, Gain.

A microwave phase bridge or interferometer was constructed and tested for the purpose of measuring high electron densities in pulsed plasmas. The initiation and growth, both in time and space, of a pulsed plasma (1 torr) were studied by observations of intensity and line shape of several spectral lines. Measurement of Stark splitting yielded plots of electric field intensity and hence space charge distribution as functions of axial position and time. The discharge started near the anode and propagated towards the cathode, the electric field near the cathode

AD-606 407 Div. 25
OTS Prices: HC $2.00/MF $0.50

California Univ., Riverside.
ENERGY OF ELECTRONS EXTRACTED FROM SOLIDS BY HIGH ELECTRIC FIELDS.
Final rept. for Jun 59-Sep 64,
by Allan M. Russell. Sep 64, 37p
Contract Nonr1842 02, Proj. NR017 441
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Field emission, Spectroscopy), Electrons, Electric fields, Electron optics, Silicon, Spectrum analyzers, Cathodes, Optical properties.

Research on the following aspects of field emission spectroscopy is summarized: resolution and electron optics; phase sensitive detection; field emission spectra of silicon; improved spectrometer; optical properties of field emission cathodes; preliminary measurements on photo-stimulated emission.

AD-606 421 Div. 25
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Schenectady, N. Y.
MEASUREMENT OF DAMPING.
Technical information series,
by R. Plunkett. 15 Jul 59, 25p R59GL177
Unclassified report

Prepared for presentation at the ASME Colloquim on Damping, Atlantic City, 1 Dec 59.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Damping, Measurement), Test methods, Data, Materials, Vibration, Elasticity, Energy, Stresses, Resonance, Frequency, Mathematical analysis.

AD-606 457 Div. 25
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COMPLETE SOLUTION FOR AN ELASTIC HALF-SPACE UNDER A POINT STEP LOAD,
by H. A. Lang. 23 Oct 57, 34p P-1141
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Mechanical waves, Loading (Mechanics)), (*Surface properties, Mechanical waves), (*Elasticity, Theory), Stresses, Boundary value problems, Mathematical analysis, Equations, Mechanics, Strain (Mechanics), Integrals.

The problem of the dynamic response of an elastic half-space to a unit step load is continued by extending the method developed by the author in a previous paper to include the phenomena of total reflection and Rayleigh surface waves. Confirmation of the method is provided by developing the displacement potentials everywhere in the half-space and showing that, for Poisson's ratio = 1/4, the surface displacements agree identically with the equations of Pekeris. The boundary condition of vanishing surface stress is also verified. The potentials and displacements, expressed in integral form, represent the complete solution of the problem. (Author)

AD-606 470 Div. 25, 4, 14, 17
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENT OF THERMODYNAMIC PROPERTIES OF COMPOUNDS OF ELEMENTS IN GROUPS II, IV V AND VI.
Final rept.,
by Michael B. Bever, Brian W. Howlett, Somnath Misra, Peter M. Robinson, and Peter Beardmore. 14 Jul 64, 44p
Contract AF19 604 5588, Proj. 5620, Task 562001
AFCRL 64 623
Unclassified report

Descriptors: (*Intermetallic compounds, Thermodynamics), (*Solid solutions, Thermodynamics), Heat of formation, Crystal substructure, Heat of solution, Heat of fusion, Melting, Specific heat, Antimony compounds, Bismuth compounds, Magnesium compounds, Indium compounds, Selenides, Tellurides, Germanium alloys, Tin alloys, Lead alloys, Thermochemistry, Chemical bonds, Phase studies, X-ray diffraction analysis, Hardness.

The research was concerned with the measurement and interpretation of thermodynamic properties of certain compounds and solid solutions. The following measurements were made. Heat of formation: Sb_2Se_3, Sb_2Te_3, Bi_2Se_3, Bi_2Te_3, Mg_2Ge, Mg_2Sn, Mg_2Pb, In2Te, InTe, In_2Te_3, In_2Te_5; solid solutions in the systems Bi_2Te_3-Bi_2Se_3, Sb_2Te_3-Bi_2Te_3, and Sb-Bi. Energies of order-disorder: certain compositions in the systems Bi_2Te_3-Bi_2Se_3 and Sb_2Te_3-Bi_2Te_3. Heats of solution: Mg, Ge and Pb in Sn; Sb, Se, and Te in Bi. Heats of fusion and melting points: Sb_2Te_3, Bi_2Te_3, Mg_2Sn, Mg_2Pb, InTe, In_2Te_3. Heat capacities near the melting points: Sb_2Te_3, Bi_2Te_3. The thermodynamic properties were interpreted in relation to the bonding of the compounds and the solid solutions and to the nature of the relevant phase transitions. (Author)

AD-606 479 Div. 25, 1, 12
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Long Beach, Calif.
A STUDY OF THE THERMAL CONDUCTANCE OF METALLIC JOINTS.
Technical note,
by G. W. Gurry and H. S. Cote. 23 Jan 58, 23p
LB-25705
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thermal conductivity, Metal joints), (*Metal joints, Thermal conductivity), Structural parts, Aerodynamic heating, Aircraft, Guided missiles, Surface properties, Panels (Structural), Beams (Structural), Structures, Stresses, Riveted joints, Aluminum alloys, Stainless steel, Pressure.

This report presents the results of a study of the thermal conductance of structural joints utilized in aircraft and missiles. The purpose of the study was to determine the range of values for the thermal conductance of typical aircraft and missile structural joints as well as some of the more important factors which influence these values. It is concluded that the conductances may range from 150 to 1300 BTU/HR sq. ft. degrees F for typical skin-rib structure which is exposed to moderate aerodynamic heating. A more precise prediction of the conductance necessitates an experimental program. In addition, the effects of interface pressure and mating surface roughness were established as the most important factors contributing to the joint conductance. (Author)

Rept. for 13 May 63-30 Apr 64,
by John Vieira and W. F. Riley. Aug 64, 59p
Contract AF29 601 5362, Projs. 1080, 5710,
Task 108012
WL TDR64 65

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structural shells, Photoelasticity), (*Photoelasticity, Structural shells), Cylindrical bodies, Stresses, Thickness, Load distribution, Mathematical analysis, Polariscopes, Optical analysis, Hydrostatic pressure, Heat treatment.

A study was conducted to determine stress distributions in several types of thick-walled cylindrical shells. The stresses were determined by using both the embedded-polariscope and stress-freezing methods for three-dimensional photoelasticity. The study indicates that an approximate analytical solution for stresses in thick-walled cylinders with hemispherical heads is sufficiently accurate for structural design applications. Simple curved beam theory is also shown to give reasonable stress values for certain structures which take the form of a thick-walled half cylinder. Finally the study indicates that embedded polaroid elements perform satisfactorily under complex states of stress; therefore, the embedded-polariscope method represents a completely feasible approach for transient three-dimensional stress determinations. (Author)

AD-606 609 Div. 25, 8, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING, WAVE PROPAGATION AND THE WKB APPROXIMATION,
by Richard Bellman and Robert Kalaba.
26 Dec 57, 8p P-1239

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Electromagnetic wave reflections, Numerical analysis), (*Invariance, Propagation), Refraction, Differential equations, Series, Matrix algebra, Wave transmission.

In previous papers, some applications of the principle of invariant imbedding to radiative transfer and neutron diffusion processes were presented. This use of invariance principles was stimulated by the fundamental work of Ambarzumian and Chandrasekhar, and strongly influenced by the point of regeneration technique of Bellman and Harris, and the theory of dynamic programming. Fundamental for the success of these techniques as applied to the above processes is the ability to consider the overall physical process as a sequence of local processes. For the case of particles, this is easily done. This paper indicates how wave propagation may be considered in these terms. It is rather remarkable that the results are based upon an algorithm that, in general, can yield divergent series. Following a provocative paper by Bremmer, the aim is to show that wave propagation can be discussed in terms of reflection and refraction at infinitesimally separated interfaces. It was proven that the convergence of the Bremmer series can be established under a simple assumption concerning the slowly varying nature of the local wave number.

AD-606 636 Div. 25, 26
OTS Prices: HC $2.00/MF $0.50

Optics Technology, Inc., Belmont, Calif.
FIBER OPTICS IMAGE DEVICE.
Final rept. for Apr 62-Jul 63,
by D. F. Capellaro. Aug 64, 35p
Contract AF30 602 2746, Proj. 5578, Task 557803
RADC TDR64 217

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fiber optics, Images), Optical equipment, Manufacturing methods, Fibers, Bonding, Machines, Design, Feasibility studies, Display systems.

The development of a fiber optics image device using the 'cylindrical fibers redistribution system' is discussed. The program included the investigation of various fabrication techniques and the construction of equipment for the suitable manipulation of fiber layers to form an image device. Three fabrication techniques, (1) rotating substrate, (2) expanding substrate, and (3) expanding-contracting, were investigated. A machine was designed and constructed for the production of fiber layers which would be close packed at one end and spaced by 12 times the diameters of the fibers at the other end. The basic feasibility of a fiber optics image enlargement device and the machinery required for its fabrication was fairly well proven in the program. (Author)

AD-606 640 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Centre National de la Recherche Scientifique, Paris (France).
HIGH VACUUM ULTRAVIOLET EFFECTS.
Technical documentary rept. for 1 Apr 63-31 Mar 64,
by B. Vodar. Aug 64, 14p
Contract AF61 052 679, Proj. 7367, Task 736704
ML TDR64 259

Unclassified report

Descriptors: (*Ultraviolet spectroscopy, Vacuum), (*Phototubes, Vacuum apparatus), Sparks, Electric discharges, Plasma physics, Photocathodes, Photons, Uranium, Tungsten, Anodes, Ultraviolet radiation.

Optimum electrical parameters have been determined for use with the three-electrode vacuum spark to obtain proper operation. The discharge viewed 'side-on', with the anode perpendicular to the optical axis, does not yield quite as reproducible results as the discharge viewed 'end-on', where the anode lies on the optical axis and just the diameter of the anode is seen. The photon output is larger with the latter arrangement. Both uranium and tungsten anodes have been used and light output measurements show little difference between the two anode materials except below 15 KW. (Author)

AD-606 645 Div. 25, 15
OTS Prices: HC $3.00/MF $0.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
CHARACTERISTIC VALUES FROM A NEW APPROACH TO PHASE INTEGRAL APPROXIMATION.
Scientific rept.,
by K. M. Hagenbuch. 10 Sep 64, 54p IRL-219
Contract AF19 628 4014, Proj. 8605, Task 860502
AFCRL 64 638

Unclassified report

Descriptors: Quantum mechanics, Integrals), (*Atomic orbitals, Quantum mechanics), Field theory, Scattering, Nonlinear differential equations, Transformations (Mathematics), Functions, Harmonic oscillators, Taylor's series.

reached 45 Kv/ cm in 25 nanoseconds and remained at about 58 Kv/ cm during almost the total pulse duration of 500 nanoseconds. The total optical radiation after 24 nanoseconds is only 5 percent of its value after 500 nanoseconds. A set-up was constructed for studying interactions between an electron beam and a plasma. The plasma was produced by electron impact in the beam when the gas pressure was between 0.0001 and 0.01 torr. Some electronic gain was observed but no quantitative results were obtained because of experimental difficulties in maintaining a strong beam and an appropriate plasma. (Author)

AD-606 519 Div. 25
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
THE STABILITY UNDER AXIAL COMPRESSION AND LATERAL PRESSURE OF A CIRCULAR-CYLINDRICAL SHELL WITH AN ELASTIC CORE,
by Paul Seide. 1 Mar 60, 28p STL/TR-60-0000-09032, STL/EM-10-1
Unclassified report

Descriptors: (*Cylindrical bodies, Structural sheets), (*Structural shells, Stability), (*Loading (Mechanics), Structural shells), Compressive properties, Pressure, Structures, Mathematical analysis, Stresses, Buckling (Mechanics), Elasticity.

The stability under axial compression and lateral pressure of a finite circular-cylindrical shell with an elastic core is treated by means of Donnell's equations. For lateral pressure it is found that a previous solution treating the cylinder as a ring or a long cylinder is adequate for a wide range of combinations of length-radius ratio, radius-thickness ratio, and ratio of moduli of core and cylinder. Results for axial compression are included for completeness and to correct a previous analysis of the same problem. (Author)

AD-606 534 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE MASER: A NEW TYPE MOLECULAR AMPLIFIER FOR MICROWAVE RADIATION,
by W. H. Culver. Rev. 18 Oct 57, 22p P-1171
Unclassified report

Prepared for the October 25, 1957 issue of Science. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Masers, Operation), Microwave spectroscopy, Microwave amplifiers, Design, Molecular beams, Gain, Noise (Radio), Magnetic fields, Energy, Crystals, Theory.

The principle of operation of the maser is presented. A number of masers which have been built or proposed are investigated. These include the molecular beam maser, the negative temperature maser, the optically pumped maser, and the solid state maser.

AD-606 536 Div. 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AXISYMMETRIC WAVE FIELDS.
Progress rept.,
by H. A. Lang. 20 Aug 57, 16p P-1173
Unclassified report

Presented at the Impact Symposium (2nd), Washington, D.C., 22-24 May 57, sponsored by ARDC and NRL.

Descriptors: (*Mechanical waves, Propagation), (*Propagation, Mechanical waves), Boundary value problems, Elasticity, Loading (Mechanics), Axisymmetric bodies, Dynamics, Functions, Stresses.

A new method for the solution of wave propagation problems is applied to axisymmetric wave fields.

AD-606 559 Div. 25
OTS Prices: HC $2.00/MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
TRANSIENT REFLECTION AND TRANSMISSION OF A PLANE WAVE NORMALLY INCIDENT UPON A SEMI-INFINITE ANISOTROPIC PLASMA,
by Carl T. Case. Jul 64, 44p
Proj. 4642, Task 4642
AFCRL 64 550; AFCRL PSRP33
Unclassified report

Descriptors: (*Plasma physics, Wave transmission), (*Wave transmission, Plasma physics), (*Magnetohydrodynamics, Wave transmission), Electromagnetic wave reflections, Electrons, Motion, Partial differential equations, Integral transforms, Electromagnetism, Theory.

General solutions for the transmitted and reflected waves in integral form are obtained for a plane wave of arbitrary time dependence, normally incident upon a semi-infinite, cold, collisionless, homogeneous, anisotropic ionized medium. The special case of an isotropic plasma with an incident wave of harmonic time dependence is also investigated. (Author)

AD-606 562 Div. 25
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
THE STABILITY UNDER AXIAL COMPRESSION AND LATERAL PRESSURE OF CIRCULAR-CYLINDRICAL SHELLS WITH A SOFT ELASTIC CORE.
Expanded edition,
by Paul Seide. Jan 61, 57p
STL/EM-11-3, STL/TR-61-0000-19015
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Structrial shells, Compressive properties), (*Cylindrical bodies, Structrial shells), Stability, Elasticity, Pressure, Loading (Mechanics), Stresses, Buckling (Mechanics).

The stability under axial compression and lateral pressure of a finite circular-cylindrical shell with an elastic core is treated by means of Donnell's equations. The stability criterion is investigated in detail for the general cylinder under axial compression or lateral pressure and for a particular cylinder under combined loading. Comparisons are made with available experimental data. (Author)

AD-606 571 Div. 25
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
THREE-DIMENSIONAL PHOTOELASTICITY STUDY OF THICK-WALLED CYLINDRICAL SHELLS.

(*Plasma medium, Fluid flow), Electrical properties, Magnetic fields, Effectiveness, Enthalpy, Energy conversion, USSR.

Using a one-dimensional formulation of the problem, an analysis is conducted of conditions of flow in the duct of a magnetohydrodynamic (MHD) generator during condition of constancy of speed which takes into account factors influencing change of electrical efficiency and induction of magnetic field on its length. Special attention is given to selection of parameters by which it is expedient to compare various types of generators, and by analysis of influence of conditions of operation of MHD-generator on its internal efficiency. It is shown that the internal efficiency of a generator is determined by value of local electrical efficiency, and consequently, for a MHD-installation the kind of electric efficiency at which the generator operates is important. (Author)

AD-606 757 Div. 25, 15
OTS Prices: None/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN MATHEMATICAL METHODS OF SOLVING ENGINEERING PROBLEMS,
by I. A. Birger. 6 Apr 64, 180p
FTD MT63 190; TT 64 71502

Unclassified report

Edited machine trans of Nekotorye Matematicheskie Metody Resheniya Inzhenernykh Zadach, Moscow, 1956, 151p.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.
Document is available in microfiche only.

Descriptors: (*Engineering, Mathematics), (*Mechanics, Structures), (*Functions, Differential equations), (*Integral equations, Boundary value problems), Elasticity, Stability, Vibration, Strength, Rods, Structural shells, USSR.

In this report there is given an application of normal fundamental functions and integral equations for solving engineering problems. Examples considered refer to problems of strength, stability and vibrations of elastic systems, however, the results can be used also in other fields of engineering.

AD-606 759 Div. 25
OTS Prices: HC $3.00/MF $0.75

Metals Research Lab., Brown Univ., Providence, R. I.
ULTRASONIC METHODS IN THE STUDY OF DEFORMATION IN SINGLE CRYSTALS.
Rept. for 1 Jan-31 Dec 63,
by Bruce Chick, Akira Hikata, George Anderson, Charles Elbaum, and Rohn Truell. Mar 64, 68p
Contracts AF33 657 8324, Continuation of AF33 616 6945, Proj. 7360, Task 736002
ML TDR64 34

Unclassified report

Descriptors: (*Single crystals, Deformation), (*Crystal lattice defects, Vibration), (*Aluminum, Crystal lattice defects), Ultrasonic radiation, Attenuation, Mechanical waves, Propagation, Stresses, Crystal structure, Plasticity, Lithium compounds, Fluorides, Sodium compounds, Chlorides, Recording systems.

The purpose of the investigation was that of understanding the physical changes which occur in aluminum and in certain ionic crystals during and after deformation. The investigation involved the study of imperfection behavior generally, and specifically the interaction of point defects with moving and vibrating dislocations, as well as the contribution of dislocations to the anharmonic characteristics of solids. (Author)

AD-606 761 Div. 25, 2, 13
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF CONDITIONS OF SERVICE OF UNDERGROUND PIPE LINES DURING EARTHQUAKES,
by T. Rashidov. 26 Dec 63, 18p
FTD MT63 130; TT 64 71496

Unclassified report

Edited machine trans. of Akademiya Nauk Uzbekskoi SSR, Tashkent. Izvestiya. Seriya Tekhnicheskikh Nauk, 1962, no. 5, p. 44-52.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Earthquakes, Underground structures), (*Underground structures, Pipes), (*Pipes, Earthquakes), Earthquake-resistant structures, Dynamics, Statics, Deformation, Stresses, Seismic waves, Seismology, Creep, Steel, Elasticity, Equations.

From the static theory of the earthquake resistance of constructions, it is assumed that a pipe line and the ground surrounding it are deformed identically. The relative dislocations are not considered. Formulas were obtained for determining stresses on a pipe line during the propagation of longitudinal seismic wave in a direction along the axis of the pipe line. The creep of particles of ground from the pipe line were considered by means of a certain coefficient, which for an evaluation of the magnitude of stresses is assumed to be equal to unity. The creeping of a pipe line from particles of ground was considered depending upon volume of ground, participating in the joint movement of the cited medium ground-pipe line. On the basis of several examples a conclusion was reached about large reserve in strength of ordinary steel pipe lines during earthquakes of average and high intensities. In this work on the basis of dynamic theory of earthquake resistance of a hydroelastic system a dynamic theory of earthquake resistancy of underground pipe lines is proposed.

AD-606 778 Div. 25
OTS Prices: HC $3.00/MF $0.75

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE DOUBLE REFRACTION TEMPORARILY PRODUCED IN ISOTROPIC BODIES, AND ON THE RELATIONSHIP BETWEEN MECHANICAL- AND PHOTOELASTICITY,
by M. G. Wertheim. 18 Sep 64, 62p
RSIC 270; TT 64 71482

Unclassified report

Trans. of Annales de Chimie et de Physique (France) 1854, ser. 3, v. 40, p. 156-221.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Refraction, Theory), (*Elasticity, Theory), (*Photoelasticity, Theory), Optical phenomena, Loading (Mechanics), France.

AD-606 779 Div. 25, 27
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
RESULTS OF EXPERIMENTAL INVESTIGATION OF CONTACT HEAT EXCHANGE BETWEEN FLAT METAL SURFACES,
by V. S. Miller. 21 Sep 64, 22p
RSIC 272; TT 64 71483

Unclassified report

The wave equation and a square integrability condition on allowable solutions, both transformed to a first order nonlinear system, are used to produce phase integral approximations to quantization conditions for bound state quantum mechanical problems. (Author)

AD-606 649 Div. 25
OTS Prices: HC $2.00/MF $0.50

Paris Univ. (France).
STUDY OF A PLASMA OF ARGON AND ARGON-HYDROGEN MIXTURE.
Technical note no. 2,
by A. Constantin, J. Godart, J. J. Hamm, and R. Rioux.
Jun 64, 26p
Contract AF61 052 727
AFCRL 64 745

Unclassified report

Descriptors: (*Argon, Plasma medium), (*Hydrogen, Plasma medium), (*Plasma medium, Argon), Transport properties, Plasma physics, Differential equations, Statistical functions, Conductivity.

In this report the relative importances of elastic, inelastic, e-i and e-e collisions are investigated for plasmas of Argon and Argon-Hydrogen mixture. A differential equation neglecting propagation effect, is given, allowing to calculate the conductivity of a plasma when the isotropic part of the distribution function is known. The computation of stationary conductivity of an Argon plasma with small amounts of molecular hydrogen is made for a Maxwellian distribution function. (Author)

AD-606 656 Div. 25, 14
OTS Prices: HC $3.00/MF $0.50

Hebrew Univ., Jerusalem (Israel).
RESEARCH ON OPTICS OF SELECTIVE SURFACES.
Final rept. for 1 Sep 59-31 May 63,
by H. Tabor. 12 May 59, 56p
Contract AF61 052 279
AFCRL 64 351

Unclassified report

A portion of the original document contains fine detail which may make reading photocopy difficult.

Descriptors: (*Solar radiation, Absorption), (*Optical filters, Surface properties), (*Nickel compounds, Peroxides), Optical phenomena, Thermal radiation, Mathematical models, Electrodeposition, Microstructure, Chromium compounds, Dioxides, Israel, Coatings.

Selective surfaces for solar energy absorbers comprise a metal base, of low intrinsic thermal emissivity modified - usually by the addition of surface coatings to obtain a high absorptivity to solar radiation with as little increase as possible to the emissivity. This combination constitutes a reflection filter. The programme concerned itself primarily with nickel-black coatings produced by electro-deposition. It was shown that the chemical and optical properties of these coatings varies with thickness and with the conditions in the placing bath. New optical and mathematical techniques were developed to determine the optical constants of thin absorbing layers (which are not necessarily isotropic in depth) and how to manipulate them to produce filters with desired characteristics. Early selective surfaces of this kind used a pair of different nickel-black layers on a metal base and passable filter properties were obtained. Development of the theory of these surfaces suggested the addition of an intermediate layer (metallic) to produce a three-layer system with a very broad interference region in the solar spectrum. Some work was started on other 'blacks' such as chromium-black. (Author)

AD-606 682 Div. 25
OTS Prices: HC $1.00/MF $0.50

University Coll., London (England).
AUGER RECOMBINATION INTO TRAPS.
Scientific rept. no. 3,
by P. T. Landsberg, C. Rhys-Roberts, and P. Lal.
1 Jul 64, 12p
Contract AF61 052 664
AFCRL 64 747

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solid state physics, Theory), Semiconductor devices, Thermal conductivity, Mathematical analysis, Brillouin zones, Electrons, Low temperature research.

AD-606 700 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Ionosphere Research Lab., Pennsylvania State Univ., University Park,
ELECTROMAGNETIC WAVE REFLECTION FROM AN OSCILLATING, COLLISION-FREE MAGNETO-IONIC MEDIUM.
Scientific rept.
by O. E. H. Rydbeck. 20 Jun 64, 68p IRL-211
Contract AF19 628 4014; Grant NSF G18983,
Proj. 8605, Task 860502
AFCRL 64 610

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electromagnetic wave reflections, Magnetic fields), (*Magnetic fields, Electromagnetic wave reflections), Electrons, Electromagnetic waves, Propagation, Space charges, Velocity, Resonance, Ionization, Mathematical analysis, Magnetohydrodynamics, Theory.

A collision free or low collision magneto-ionic medium is easily perturbed by a driving or pumping wave, even of moderate power. Unless the pump wave is of the longitudinal mode it will generate longitudinal electron velocities as well as differential space charge densities. These quantities, as well as the transverse, pump field electron velocities, will affect the propagation of any (low power) signal or probing wave propagating through the medium, which now has oscillating and travelling electron velocity and electron density ripples.

AD-606 741 Div. 25, 7, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FLOW OF ELECTRO-CONDUCTIVE GAS WITH CONSTANT SPEED IN THE DUCT OF A MAGNETOHYDRODYNAMIC GENERATOR,
by A. V. Gubarev, V. I. Kovgasyuk, S. A. Medin, A. E. Sheindlin, and B. Ya. Shumyatskii. 18 May 64, 14p
FTD MT64 22, TT 64 71488

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR, Izvestiya. Mekhanika i Mashinostroenie, 1963, no. 3, p. 3-8.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Generators),

ON THE STRESSES IN A NONLINEAR BEAM SUBJECT TO RANDOM EXCITATION,
by Richard E. Herbert. Aug 64, 24p
Grant AF AFOSR62 313, Proj. 9782, Task 37718
AFOSR 64 1038

Unclassified report

Descriptors: (*Beams (Structural), Stresses), (*Stochastic processes, Beams (Structural)), Nonlinear systems, Elasticity, Numerical analysis, Membranes, Loading (Mechanics), Deflection, Deformation.

The method of equivalent linearization is used to investigate the effects of the membrane force on the stresses in a simply supported Bernoulli-Euler beam subject to random excitation. It is shown that, while the mean-square membrane stress is negligible compared to the mean-square bending stress, the former nevertheless has the effect of reducing the latter. Furthermore, this reduction is less significant for higher driving frequencies, thereby reducing any 'nonlinear safety factor' that might be considered. (Author)

AD-606 826 Div. 25, 21
OTS Prices: HC $3.00/MF $0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.
Quarterly progress rept. no. 5, 15 May-15 Sep 64,
by Richard E. Balzhiser, Robert E. Barry, Bruce F. Caswell, Herman Merte, Jr., and Andrew Padilla, Jr. Sep 64,
64p ORA-05750-16-P
Contract AF33 657 11548, Proj. 05750

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-601 074.

Descriptors: (*Heat exchangers, Liquid metal coolants), (*Liquid metal coolants, Heat transfer), Film boiling, Rubidium, Sodium, Zirconium, Liquid metal pumps, Nucleate boiling, Transition temperature, Weightlessness.

A numerical analysis of the edge effects in the 1 in. diameter film boiling apparatus was completed. The uncertainty in condensing coefficients for sodium beneath the plate makes it difficult to correct for the large amount of heat which flows up the wall when the system operates in the film regime. A design for a modified boiler is presented. The forced convection apparatus was reassembled after the zirconium chips in the hot trap were replaced. Filters were added at several points in the system to collect suspended solids or oxide if either existed in the system. Despite all efforts plugs still developed and flow was obtained for only brief periods during this time. The extremely small pumping restriction seems to accentuate the problem and consideration is being given to purchasing a new pump which might permit circulation for a period sufficiently long to collect all solids in the loop filters. The agravic apparatus was operated with mercury at a/g of one. Data was obtained in the nucleate, transition and film regimes. (Author)

AD-606 829 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Naples Univ. (Italy).
PROPAGATION OF ELECTROMAGNETIC WAVES IN AN INHOMOGENEOUS MEDIUM.
Final technical rept.,
by L. G. Napolitano. Feb 64, 48p IA-115
Contract AF61 052 548
AFCRL 64 758

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Magnetohydrodynamics, Theory), (*Wave transmission, Plasma physics), (*Plasma physics, Gas ionization), (*Thermodynamics, Gas ionization), Electromagnetic fields, Thermodynamics, Dynamics, Polarization, Entropy, Enthalpy, Ionization, Mathematical models, Equations, Propagation, Motion.

This report consists of two parts dealing with; the thermodynamics and dynamics of ionized gasses; and, the influence of finite ionization rates on the wave propagation through ionized gasses. In the first part a non-relativistic phenomenological theory satisfying the Lorentzian invariance of thermodynamic quantities and not based on any a-priori assumption for the form of the electromagnetic momentum density is developed of an arbitrary polarizable medium. In the second part the subject topic is dealt with by using both the one-fluid model and the Lenhert two-fluid model for the plasma.

AD-606 837 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Battelle Memorial Inst., Geneva (Switzerland).
INVESTIGATION OF ABSORPTION AND RE-EMISSION OF OXIDE CRYSTALS CONTAINING DISSIMILAR FOREIGN IONS.
Technical rept.,
by W. Schneider. 20 Aug 64, 44p
Contract AF61 052 696
AFCRL 64 797

Unclassified report

Descriptors: (*Lasers, Materials), (*Corundum, Spectroscopy), Single crystals, Impurities, Vanadium, Chromium, Absorption spectroscopy, Emissivity, Fluorescence, Nuclear paramagnetic resonance, Optical properties, Aluminum compounds, Oxides, Switzerland.

Absorption spectra, as well as activation and fluorescence spectra, of corundum single crystals doped with chromium alone, vanadium alone, and chromium plus vanadium, are presented. The fluorescence of Benitoite at room temperature and at - 190C was measured; the results are also contained and discussed in the report. (Author)

AD-606 848 Div. 25, 2
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
METEOROLOGICAL ASPECTS OF INFRARED OPERATIONS,
by J. Doyne Sartor. 3 Mar 58, 18p P-1299

Unclassified report

Presented at the 28th meeting of the Western Section of IRIS, 5 Mar 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Meteorological parameters, Infrared research), (*Infrared research, Meteorological parameters), Infrared radiation, Wave transmission, Clouds, Correlation techniques, Optics.

Three types of meteorological information are useful for infrared studies. The first type consists of average or usual conditions which can be applied most of the time. The second and third types are concerned directly with larger variations in time and space. They are distinguished by the length of time period between a request for information and its planned application. If the period falls within about 72 hours of the time of the request, a

Trans. of Akademiya Nauk URSR, Kiev. Instytut Teploenergetyky. Zbirnyk Prats', 1960, no. 20, p. 44-53. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Heat transfer, Surfaces), Metal, Thermodynamics, USSR, Gas turbines.

The design of economical gas turbine apparatus with high parameters for the operating body is associated with a comprehensive solution of the complicated problems of heat exchange in the components of turbine engines. The study of contact heat exchange between metal surfaces makes it possible to determine boundary conditions required for the calculation of the temperature fields of turbine parts. In building power engines we often use designs of individual connections in which two or more parts come into contact directly with each other through which there is a heat flow. Contact heat exchange surfaces are encountered in heat exchange apparatus of the chemical and metallurgical industry, in the making of instruments, in building reactors, etc. (Author)

AD-606 795 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
TRANSIENT RESPONSE OF GRADED-BASE TRANSISTORS,
by George L. Salton. Aug 64, 38p
RADC TDR64 295

Unclassified report

Descriptors: (*Transistors, Transients), (*Transients, Transistors), Semiconductor devices, Mathematical analysis, Boundary value problems, Diffusion, Impurities.

Basic transient properties of graded-base transistor have been examined in terms of the minority-carrier distribution in the base region, subject to the restricting conditions of a one-dimensional device geometry and low injection. The mathematical expressions for the minority-carrier distributions in the base region and for the transient times have been found. The method used was to apply various boundary conditions to the one-dimensional diffusion equation which was solved by the 'separation of variables' technique. In order to satisfy the initial conditions of individual solutions, the general solutions of the transient times are formulated in terms of infinite series. Approximate, closed form solutions for the transient times are obtained by neglecting the higher order terms of the series. The closed-form expressions for the transient times offer good approximations for small values of f and reduce to the expressions obtained for homogeneous-base transistors when f is allowed to go to zero. (Author)

AD-606 797 Div. 25, 4, 14
OTS Prices: HC $6.00/MF $1.25

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
LOW TEMPERATURE VAPOR GROWTH STUDIES.
Scientific rept. no. 3,
by A. Reisman. 30 Jun 64, 206p
Contract AF19 628 2468, Proj. 4608, Task 460805
AFCRL 64 686

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-433 640.

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Vapors), Germanium, Gallium alloys, Arsenic alloys, Polishes, Sodium compounds, Hypochlorites, Etched crystals, Hydrogen compounds, Hypochlorites, Etched crystals, Hydrogen compounds, Iodides, Silicon, Iodine, Helium, Hydrogen, Chlorine, Transport properties, Epitaxial growth, Chemical equilibrium, Photochemistry, Absorption spectrum, Germanium compounds, Silicon compounds, Chlorides, Reduction (Chemistry).

Topics include: room temperature polishing of Ge and GaAs using NaOCl solutions; high temperature etching of Ge with HI; growth rate in the Ge-I2-He-H2 vapor transport system; exitaxial Ge growth in the Ge-C12-H2 system; Bourdon gauge measurements on the GeCl2 system; photochemical etching of Ge and Si with Cl2; optical absorption in several open tube systems; transpiration in the Ga-HI-H2 and Ge-HI-H2 systems; growth of Si single crystals by the H2 reduction of SiCl4.

AD-606 799 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROPAGATION OF THERMAL STRESS IN AN ELASTIC-PLASTIC ROD,
by Yu. P. Suvorov. 29 Jan 64, 16p
FTD MT63 225; TT 64 71505

Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1963, v. 27, no. 2, p. 383-389. Limited supply on hand: when exhausted, document will be available in microfiche only.

Descriptors: (*Thermal stresses, Propagation), Rods, Heating, Elasticity, Plasticity, Stresses, Thermal conductivity, Nonlinear differential equations, USSR.

The problem is solved concerning the propagation of stress waves in a semi-infinite elastic plastic rod due to sudden heating of the free end; consideration is given to the dependence of the coefficient of thermal conductivity on the temperature (i.e. the nonlinear equation of thermal conduction is investigated) which involves the finiteness of the speed of propagation of heat in the rod. Calculation of this leads to quantitative features of the elastic solution as compared with known earlier solutions. It is assumed that the material of the rod is incompressible and possesses linear hardening; mechanical properties are considered to be independent of temperature. (Author)

AD-606 805 Div. 25
OTS Prices: HC $2.00/MF $0.50

Maryland Univ., College Park.
THE ZERO-POINT ENERGY OF AN ELECTRON LATTICE,
by Alexei A. Maradudin and Rosemary A. Coldwell-Horsfall.
May 60, 38p MUP TR177
AFOSR TN60 446

Unclassified report

Prepared in cooperation with Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park. A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Crystal lattices, Electrons), Chemical bonds, Atomic orbitals, Melting, Stability, Statistical functions, Vector analysis.

AD-606 810 Div. 25, 1
OTS Prices: HC $1.00/MF $0.50

Florida Univ., Gainesville. Engineering Experiment Station.

26. Production and Management

AD-606 194 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A BRIEF REVIEW OF INVENTORY THEORY,
by Murray A. Geisler. Jan 62, 12p P-2517
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Inventory, Mathematical analysis), (*Optimization, Inventory), Mathematical models, Inventory analysis, Management engineering, Costs, Probability, Dynamic programming, Statistical analysis.

This paper describes the current status of inventory theory by summarizing the main results that have been obtained in the subject, particularly in the last few years. Deterministic inventory models and probabilistic models are considered, we shall also distinguish and distinctions are made between the one-period and the N-period models. The implications of the result for the user of inventory theory are stressed.

AD-606 234 Div. 26, 7
OTS Prices: HC $1.00/MF $0.50

Assembly Products, Inc., Chesterland, Ohio.
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
Quarterly progress rept. no. 5, 1 May-31 Jul 64,
by R. H. Nichols. 31 Jul 64, 10p
Contract DA36 039AMC01473E
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Measuring devices (Electrical and Electronic), Manufacturing methods), Voltmeters, Ammeters, Test equipment, Performance (Engineering), Machines, Tests.

Testing of seven 'state-of-the-art' samples in accordance with combinations of the specified requirements gave generally good results. Selection of the best grade of iron for the working vanes has been started using samples of different alloys. Several manufacturing variables which affect meter performance were studied. A new anvil plate has been installed on the shock testing machine in an attempt to resolve difficulties in producing specified test conditions. Tooling has been completed for the window sealing gaskets for 2 1/2 and 3 1/2 inch meters. Tooling has been started for dial plates, scale printing, 2 1/2 inch window, cases, and the mechanism top bracket stamping. (Author)

AD-606 261 Div. 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONTINUOUS PRODUCTION AND EMERGENT DEMAND,
by T. A. Goldman. 9 Jul 57, 13p P-1010
Unclassified report

Descriptors: (*Spare parts, Costs), (*Industrial production, Spare parts), Probability, Models (Simulations), Scheduling, Inventory, Replacement theory, Management planning.

A model of the real and monetary costs involved in supplying spare parts from current production is presented. The model leads to a cost function for each part individually depending on its production characteristics and its demand probability function, and on certain policy variables. By choosing appropriate values for the policy variables, the cost function for each part can be minimized independently of the others.

AD-606 284 Div. 26
OTS Prices: HC $3.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRODES AND FLUXES FOR ARC WELDING,
by N. B. Fishbein. 23 May 63, 70p
FTD TT62 1522; TT 63 23617
Unclassified report

Elektrody i Flyusy dlya Dugovoi Svarki, unedited rough draft trans. of Nauchno-Populyarnaya Biblioteka Rabochego-Svarshchika (USSR) 1961, v. 9, 62p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Welding rods, Welding), (*Welding fluxes, Welding), Welds, Production, Steel, Alloys, Metals, Coatings.

This publication recounts the history of the development of electrodes and fluxes, describes the influence of electrodes and fluxes on the quality of welded joints, and gives examples of the mechanization of electrode production. (Author)

AD-606 291 Div. 26, 17
OTS Prices: HC $3.00/MF $0.75

Fansteel Metallurgical Corp., North Chicago, Ill.
COLUMBIUM ALLOY SHEET ROLLING PROGRAM.
Final rept. for 7 Mar 63-1 Sep 64,
by H. L. Kohn and R. M. Curcio. Oct 64, 72p
Contract NOw63 0231c
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Niobium alloys, Rolling (Metallurgy)), (*Rolling (Metallurgy), Niobium alloys), Sheets, Tantalum alloys, Tungsten alloys, Zirconium alloys, Vanadium alloys, Molybdenum alloys, Creep, Rupture, Transition temperature, Welding, Chemical analysis, Mechanical properties.

Six inch diameter, 300 lb. ingots of FS-85 (Cb-27Ta-10W-1Zr) and B-66 (Cb-5V-5Mo-1Zr) were processed to produce 0.060 in x 18 in wide sheet. The FS-85 was successfully converted to target dimensions while the B-66 sheets did not meet the 18 in width criteria. The finished sheet was evaluated with respect to chemical and mechanical properties and weldability. The ingot to sheet yield for FS-85 was 51.1% while the yield for B-66 was only 21.5%. FS-85 was considerably easier to fabricate accounting for the greatly superior yield of finished sheet from ingot. The quality of the sheet produced was roughly equivalent for the two alloys except that the FS-85 had better flatness.

AD-606 297 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING: METHODS AND APPLICATIONS,
by Stuart E. Dreyfus. Revised 6 Oct 58, 14p P-1029
Unclassified report

forecast for the future period is best. For longer periods in the future, meteorological studies of accumulated past data are appropriate. When properly applied these produce valuable and useful results. It is this latter type of information that is discussed in this paper. (Author)

AD-606 858 Div. 25, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
POISSON'S RATIO FOR HONEYCOMB SANDWICH CORES,
by George A. Hoffman. 7 Apr 58, 6p P-1330
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Honeycomb cores, Elasticity), (*Elasticity, Honeycomb cores), Sandwich construction, Structural properties, Strain (Mechanics), Stresses, Mathematical analysis, Integrals.

An interesting mechanical property of honeycomb cores is their Poisson's ratio: it is very sensitive to cell geometry and can assume values from zero to about three. Large values may be observed when flexing some slabs of honeycomb with flat cell walls, while rippled wall honeycombs demonstrate zero Poisson's ratio. The ratio of anticlastic curvatures is indicative of the value of Poisson's ratio for axial loading in the plane of the slab. Equilateral hexagonal and square cells were considered here; the doubled foil line the x-direction, and the cell width, a, the spacing between doubled foil lines (see insert, Fig. 1). The angle d between the x-axis and an adjacent wall is 60 degrees for regular hexagonal cells, though in practice it may be much less (the so-called under-expanded core), or well beyond 60 degrees over-expanded cores). Reducing the doubled foil line to a minimum, results in a nearly quadrilateral cell, herein assumed square. Conforming to common practice, the doubled foil line was assumed parallel or perpendicular to the loading or bend axis.

must be adapted when the perfect capital market assumed by Fisher in his analysis does not exist--in particular, when the borrowing and lending rates diverge, when capital can be secured at an increasing marginal borrowing rate, and when capital is 'rationed'. Finally, an error by Fisher in his treatment of multi-period investments which has been the source of much difficulty is corrected. In doing so, support is given the contentions of those who reject the internal rate of return as an investment criterion, showing more clearly, it is believed where th error lies and how the internal rate would have to be redefined if it is to be used as a reliable guide.

AD-606 547 Div. 26
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROBLEMS IN THE THEORY OF THE FIRM,
by H. M. Wagner and T. M. Whitin. 4 Oct 57, 42p
P-1191
Unclassified report

Paper is included as Appendix 8 in T. M. Whitin, The Theory of Inventory Management, 2d ed., 1957.
Legibility of this document is in part unsatisfactory.
Reproduction will be made from best available copy.

Descriptors: (*Operations research, Management engineering), (*Inventory, Mathematical models), (*Management engineering, Operations research), Inventory control, Production control, Costs, Management planning, Dynamic programming, Optimization, Statistical analysis, Theory.

This paper extends the familiar analysis of the theory of the firm to dynamic deterministic situations. A method for obtaining the optimal time profile of production and sales for a firm facing known demand and cost schedules over n periods is discussed. Demand is assumed to be a function of the price charged during the period, and costs include direct manufacturing expenses, inventory holding charges, and fixed or setup costs incurred when period production takes place. The purpose is to frame and solve the problem in terms and with techniques familiar to most economists. From a mathematical point of view, the analysis is another application of dynamic programming type procedures. From a conceptual and computational point of view, the approach heavily rests on standard constructs in economic theory, thus potentially offering added insight into the logic of the solution.

AD-606 558 Div. 26, 27
OTS Prices: HC $1.00/MF $0.50

ARDE-Portland, Inc., Paramus, N. J.
CRYOGENIC STRETCH-FORMING OF SOLID PROPELLANT ROCKET CASES.
Quarterly rept. no. 9, 1 Jun-31 Aug 64,
by R. H. Alper. 31 Aug 64, 17p
Contracts DA30 069ORD3501,
continuation of DA30 069ORD3099
16
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Stretch forming, Cryogenics), (*Rocket cases, Stretch forming), Pressure vessels, Buckling (Mechanics), Welds, Fracture (Mechanics), Stresses, Thickness.

Three subscale high strength vaessel preforms were fabricated and two of these were stretched. Very high stress levels were successfully achieved with the high strength cases during the cryogenic stretch-forming operation. This indicates that high room temperature strength may be anticipated after aging. The first two full-scale preforms were completed and stretched. Several problems were encountered. The basic problem which manifested itself during the stretch of the first preform consisted of severe buckling at the forward end of the case. A leak at the weld joint at the large diameter of the 'dog-bone' was attributed to the buckling. A second case was stretched to confirm the conclusion that the buckling was a cause for the weld cracking. A design analysis was performed which indicated that the compressive stresses at the forward end were high during the lower pressures of the stretch-forming operation. (Author)

AD-606 576 Div. 26, 17
OTS Prices: HC $5.00/MF $1.25

Norair Div., Northrop Corp., Hawthorne, Calif.
TANTALUM AND MOLYBDENUM BRAZING TECHNIQUES.
Rept. for 1 Jun 63-30 Jun 64,
by A. H. Freedman, L. H. Stone, and E. B. Mikus.
Sep 64, 198p NOR-64-156
Contract AF33 657 11227, Proj. 7351, Task 735102
ML TDR64 270
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Molybdenum alloys, Brazing), (*Tantalum alloys, Brazing), (*Brazing, Honeycomb cores), Titanium alloys, Zirconium alloys, Tungsten alloys, Hafnium alloys, Niobium alloys, Vanadium alloys, Joints, Thermal insulation, Diffusion.

Brazed molybdenum and tantalum alloy honeycomb structures offer good potential for structural and heat shield applications in the 2500-3500 F range. However, molybdenum is seriously embrittled at braze temperatures above approximately 2500F. Tantalum alloys are not embrittled by high braze temperatures, but there are serious production problems associated with braze temperatures above 3200F. The purpose of this program was to develop molybdenum and tantalum braze systems which braze at relatively low temperatures, but develop high remelt and service temperatures. Some attention was also directed to the development of braze alloys for tantalum that braze several hundred degrees above the expected service temperature. Most of the effort was based on TZM molybdenum alloy and Ta-10W alloy. Some work was performed using Ta-8W-2Hf and Ta-30Cb-7. 5V.

AD-606 595 Div. 26, 18, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INVENTORY CONTROL; EXPLOITING THE ELECTRONIC DATA PROCESSOR IN THE AIR FORCE,
by Leon Gainen. 20 Nov 57, 24p P-1220
Unclassified report

Descriptors: (*Inventory control, Data processing systems), (*Data processing systems, Inventory control), Logistics, Management engineering, Decision making, Air Force procurement, Air Force.

This paper discusses an Air Force logistical EDP application in order to open new vistas for the Industrial Engineer whose familiarity with the data processing field has not been developed in association with his own problem solving techniques.

Descriptors: (*Dynamic programming, Replacement theory), (*Replacement theory, Decision making), Optimization, Machines, Maintenance, Equations.

Dynamic programming is a mathematical technique applicable to multi-stage decision process problems. By observing that 'an optimal policy has the property that whatever the initial state and initial decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision' one can represent the process in the form of a functional equation. For finite processes, this equation can be solved recurrently, and one can determine the optimal policy. An interesting and important example of such a process is encountered when one considers the equipment replacement problem. One seeks to determine the optimal time to replace old equipment by new. This process is particularly amenable to dynamic programming, and an optimal policy can be generated under realistic assumptions. The functional equation approach of dynamic programming has also proved useful when applied to a wide variety of problems in the fields of industrial mathematics, logistics, economics, military planning, and pure mathematics and physics. (Author)

AD-606 301 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A GENERALIZED EQUIPMENT REPLACEMENT STUDY,
by Stuart E. Dreyfus. 15 Mar 57, 19p P-1039
Unclassified report

Descriptors: (*Dynamic programming, Replacement theory), (*Replacement theory, Decision making), Machines, Maintenance, Equations, Costs, Mathematical models.

The functional equation technique of dynamic programming is useful in determining the optimal age of replacement of durable machinery. The paper reviews Bellman's analytic solution of a simplified model, presents a computation scheme applicable to more realistic models, and discusses various dynamic programming formulations applicable in the field of equipment replacement. (Author)

AD-606 327 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AUTOMATIC DATA-PROCESSING FOR PRODUCTION CONTROL,
by L. S. Hill. Dec 61, 21p P-2497
Unclassified report

Descriptors: (*Production control, Punched cards), (*Industrial production, Data processing systems), (*Data processing systems, Punched cards), Control systems, Recording systems, Automation, Computers, Programming (Computers), Industrial equipment, Machine tools.

It is the purpose of the paper to present in abridged form a synthesized procedure for control of production using punched-card methods. The system may be considered a framework for application to any manufacturing enterprise engaged in the fabrication and assembly of parts, regardless of product. Machines are used to record and coordinate all paperwork involved in manufacturing from time of raw material receipt through transformation into finished product. A collateral objective of this presentation is to indicate that mechanization of the production control system is a logical role for the Industrial Engineer. (Author)

AD-606 334 Div. 26, 15, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COST FINDING THROUGH MULTIPLE CORRELATION ANALYSIS,
by Paul R. McClenon. Aug 62, 16p P-2619
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Costs, Statistical analysis), (*Statistical analysis, Costs), Correlation techniques, Operations research, Management planning, Decision making.

Multiple correlation analysis will not seriously compete with established costing practices, but under some circumstances will prove useful for developing cost estimates not determinable by other means. This paper presents a simple example in order to give accountants a glimpse of the technique and to enable them to recognize potential applications. Consultation with a statistician or a good textbook is urged.

AD-606 520 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
MAXIMIZATION OF THE RELIABILITY OF A COMPLEX SYSTEM BY THE USE OF ITEMS IN SEQUENCE,
by Leo A. Aroian. [Apr 60] 24p STL/TM/60-0000-00034
Unclassified report

Descriptors: (*Reliability, Quality control), (*Redundant component, Reliability), Optimization, Distribution theory, Life expectancy, Failure (Mechanics), Probability.

The basic theory of the use of items in sequence in a complex system is developed. Particular examples are given for the exponential distribution, the terminated exponential, the normal distribution, the exponential with normal distribution wearout, and the Weibull distribution. It is noted that the problem, statistically is the same as the distribution of the sum of independent items. The treatment of degradation due to disuse of an item is included. (Author)

AD-606 526 Div. 26, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ISOQUANT APPROACH TO INVESTMENT DECISION PROBLEMS,
by Jack Hirshleifer. 23 Aug 57, 46p P-1158
'Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Decision theory, Money), (*Budgets, Optimization), (*Management planning, Budgets), Economics, Commerce, Decision making.

The given notes constitute an attempt to solve, through the use of isoquant analysis, the problem of optimal investment decisions (in business parlance, the problem of capital budgeting). The initial section reviews the principles laid down in Irving Fisher's justly famous works on interest, to see what light they shed on two competing rules of behavior currently proposed by economists to guide business investment decisions--the Present-Value Rule and the Internal-Rate-of-Return Rule. The main concern is to show how Fisher's principles

MANUAL AND REPAIR WELDING OF CHEMICALLY MILLED 2014-T6 ALUMINUM SHEETING,
by K. R. Agricola. Aug 57, 27p WDD-M-MI-57-60
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction had been made from best available copy.

Descriptors: (*Aluminum alloys, Welding), (*Welding, Aluminum alloys), Sheets, Chemical milling, Welds, Tensile properties, Hardness, Panels (Structural), Maintenance.

A 2 inch wide land 0.100 in. thick, will fully retain the weld heat-affected zone of repaired welds (based on hardness data). Parent metal properties are only slightly affected by weld heat on repairs of 1.5 inch lands. Values of 59,000 psi can be expected with 90 percent confidence for repaired 1.5 inch lands. If 95 and 99 percent confidence is required, expected values for repaired 1.5 inch lands are 57,800 and 55,400 psi. If land widths of 1.625 inches and above are used, parent metal strength can be expected for manual welds followed by repair welds.

AD-606 601 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING APPROACH TO OPTIMAL INVENTORY PROCESSES WITH DELAY IN DELIVERY,
by Richard Bellman. 6 Dec 57, 12p P-1227
Unclassified report

Descriptors: (*Inventory analysis, Dynamic programming), (*Dynamic programming, Inventory analysis), Time-lag theory, Transformations (Mathematics), Functions, Sequences.

The usual dynamic programming approach to inventory processes with delays in delivery leads to functions of many variables. This multi-dimensionality prevents the straightforward utilization of digital computers. Using a type of transformation previously applied in the study of engineering control processes, it is shown that a class of inventory processes with time lags can be treated in terms of sequences of functions of one variable, regardless of the length of the delay. (Author)

AD-606 628 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
THE APPLICATION OFULTRASONICS TO WIRE DRAWING.
Final quarterly progress rept. for 1 Apr-30 Jun 64,
by A. T. Robinson, J. C. Connelly, and L. M. Stayton.
Aug 64, 17p
NOTS TP3636; NOTS TPR375
Unclassified report

Descriptors: (*Wire, Drawing (Machine processing)), (*Drawing (Machine processing), Ultrasonic radiation), (*Ultrasonic radiation, Drawing (Machine processing)), Carbon alloys, Steel, Tungsten, Tantalum, Molybdenum, Heating, Dies, Pickling, Nitric acid, Lubricants, Molybdenum compounds, Sulfides.

Die welding during drawing of annealed piano wire was alleviated by pickling the wire in a dilute nitric acid solution and using molybdenum disulfide as the lubricant. Temperature rise in the drawn wire between the die and isolator, during ultrasonic radiation, occurs at discreet points along the wire at intervals of approximately 5 inches. It appears that the points of maximum heating correspond to the antinodal points of a stationary acoustic wave. (Author)

AD-606 735 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Super-Temp Corp., Santa Fe Springs, Calif.
A COMPARATIVE EVALUATION OF THE FORMABILITY OF TUNGSTEN PLATE AND SHEET BY SPINNING TECHNIQUES.
Quarterly rept. no. 3, 1 Jan-31 Jul 64,
by D. W. Bauer. 15 Aug 64, 44p
Contract NOw63 0542c
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Tungsten, Metal spinning), (*Metal spinning, Tungsten), Metal plates, Sheets, Tensile properties, Microstructure, Hardness, Failure (Mechanics).

Physical and mechanical properties on the 'as received' sheet and plate stock, shear spinnability data on 0.250 in. tungsten plate, shear spinning uniformity data and form spinning uniformity data on 0.060 in. tungsten sheet and 0.250 in. tungsten plate are reported. (Author)

AD-606 748 Div. 26, 1, 17
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION. AERONAUTICAL ENGINEERING, 1962, VOL. 5, NO. 5: SELECTED ARTICLES,
by N. I. Reznikov, K. F. Mitryaev, V. I. Lopatin, and V. K. Zolotukhin. 28 May 64, 47p
FTD MT63 297; TT 64 71490
Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Aviatsionnaya Tekhnika (USSR) 1962, v. 5, no. 4, p. 155-173.

Descriptors: (*Titanium alloys, Machining), Symposia, Alloys, Heat-resistant materials, Automation, Scientific research, USSR.

Contents: All-union intercollegiate scientific and technical conference on problems of machinability of heat-proof and titanium alloys; Scientific and Technical conferences in the S. Ordzhonikidze Moscow Order of Lenin Aviation Institute; Intercollegiate conference report on problems of automation of durability investigations; Contents of journals for 1958, 1959, 1960, 1961, and 1962.

AD-606 782 Div. 26
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
TANDEM GRID IN A SINGLE STAGE AXIAL BLOWER,
by H. Linnemann. 21 Sep 64, 23p
RSIC 276; TT 64 71479
Unclassified report

Trans. of Konstruktion (West Germany) 1964, v. 16, no. 4, p. 128-135.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Blowers, Design), Machines, Impellers, Gas flow, Pressure, Nozzles.

In order to achieve high pressure factors in a single-stage axial blower, rotor and stator were equipped with tandem grids. Optimum arrangements of the partial grids were found for different ratios of the diameters. A comparison with the blade arrangements of single-row grids, which were designed for the same pressure and delivery factors, showed that tandem grid blading has better efficiency coefficients and a more advantageous position of the separation point. The tandem grids were especially advantageous in the case of relatively short blades. The pressure factor could be strongly varied through turning of the blades of the second rotor partial grid at an only slightly changed delivery factor, whereby the efficiency coefficient showed only small changes. Measurements in the flow behind the grids and observations of the boundary layers provided statements on the blade losses at tandem grids and at single-row grids. (Author)

AD-606 819 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Martin Marietta Corp., Denver, Colo.

produces a thrust force which compresses a strain-gage load cell to obtain a dc voltage which is linearly proportional to the thrust force. This dc voltage is applied to input of a voltage-controlled oscillator to produce a train of pulses whose repetition rate is linearly proportional to the dc voltage and, hence, motor thrust. An electronic counter totalizes the number of pulses produced during the propellant burning time, and the number so produced is, consequently, linearly proportional to the time-integral of the thrust, or total impulse, of the burned propellant. The installation, calibration, and operation of the system is described.

AD-606 563 Div. 27, 9, 14
OTS Prices: HC $3.00/MF $0.75

Army Materials Research Agency, Watertown, Mass.
SIMILITUDE IN THE TESTING OF SOLID PROPELLANT ROCKET NOZZLES,
by S. W. Gouse, Jr. Jul 64, 72p
Proj. 1A024401A111
AMRA TR64 18

Unclassified report

Descriptors: (*Rocket motor nozzles, Model tests), Rocket motors (Solid propellant), Models (Simulations), Refractory materials, Fluid flow, Laminar flow, Turbulence, Heat transfer coefficients, Cylindrical bodies, Stresses, Reynolds number.

The fluid flow, heat transfer, and stress conditions in a hollow cylinder were analyzed, assuming that the results could be at least qualitatively applied to the actual conditions that exist in and near the throat of a solid propellant rocket nozzle. The possibility of a transition in the hydrodynamic boundary layer flow from laminar to turbulent was included, and the change in results due to such transitions was demonstrated. Two types of nozzle were considered: (1) a geometrically similar series with a constant ratio of outside to inside radius, and (2) a series with a constant nozzle exit plane wall thickness. Various results such as working stress, temperature drop, heat transfer coefficients, etc., are presented for each series both separately and in comparison. The results allow one to determine how various phenomena vary with combustion pressure and throat diameter (or Reynolds number), and to plan experiments in which certain phenomena can be held constant. One can compare severity of conditions between model and prototype if small scale tests are planned and determine proper test conditions to accurately simulate prototype conditions. (Author)

AD-606 564 Div. 27, 17, 26
OTS Prices: HC $2.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.
FRACTURE TOUGHNESS OF D6AC STEEL SHILLELAGH ROCKET MOTOR CASE,
by Robert N. Katz. Jul 64, 3p
AMRA TR64 19

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Steel, Rocket cases), (*Rocket cases, Toughness), (*Fracture (Mechanics), Rocket cases), Steel, Performance (Engineering), Forging, Rupture, Thickness, Heat treatment, Welding, Fractography, Tensile properties, Chromium alloys, Nickel alloys, Molybdenum alloys, Manganese alloys, Vanadium alloys, Toughness.

Burst tests and fracture toughness measurements on D6AC Shillelagh missile motor cases were carried out. The burst testing was done over a temperature range from room temperature down to -200 F. Results of these tests showed that the motor cases burst at approximately 250,000 psi hoop stress regardless of test temperature, and that all fractures were 100 percent shear. Fracture toughness measurements were made on cases containing machined and fatigue-cracked through-the-thickness notches, at room temperature and -65 F. The results of these measurements were in good agreement with previously obtained flat sheet data on similar materials. (Author)

AD-606 653 Div. 27, 10
OTS Prices: HC $3.00/MF $0.75

Air Force Aero Propulsion Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
INLET EFFICIENCY PARAMETERS FOR SUPERSONIC COMBUSTION RAMJET ENGINES.
Rept. for Nov 6-Apr 63,
by E. T. Curran and M. Brian Bergsten. Jun 64, 57p
Proj. 3012, Task 301201
APL TDR64 61

Unclassified report

A portion of the original document contains fine detail which may make reading photocopy difficult.

Descriptors: (*Ramjet engines, Combustion), (*Combustion, Supersonic flow), (*Supersonic flow, Ramjet inlets), Thermodynamics, Kinetic theory, Dynamics, Pressure, Velocity, Performance (Engineering).

In this report, the various definitions of inlet efficiency, which are currently in use for supersonic combustion ramjet engines, are surveyed. Derivations of each of these parameters and the relationships between them are presented. Charts for the conversion from one parameter of efficiency to another are included. These charts are based on real gas properties. Attention is drawn to the application of available energy concepts to the supersonic combustion ramjet engine, and a definition of inlet effectiveness is introduced. (Author)

AD-606 740 Div. 27, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL PROOF OF THE ELASTOHYDRODYNAMIC EFFECT,
by A. V. Kol'chenko. 28 May 64, 13p
FTD MT64 47; TT 64 71486

Unclassified report

Edited machine trans. of Gosudarstvennyi Nauchno-Issledovatel'skii i Proektnyi Institut Ugol'noi, Rudnoi, Neftyanoi i Gazovoi Promyshlennosti 'Ukrniiproekt'. Nauchnye Zapiski (USSR) 1962, no. 9, p. 24-28. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lubrication, Hydrodynamics), (*Bearings, Elasticity), Fluid flow, Loading (Mechanics), Test equipment, Lubricants, Thickness, Shafts, USSR.

A new experimental method of direct measurement of the hydrodynamic flow rate of lubricant through the working slot of a bearing and lateral leaks of lubricant from the slot is described, and results of application of this method are also listed. The ability of a sliding block of the new type to work in a wide range of load at very large hydrodynamic flow rates of lubricant and immaterial magnitude of its lateral leaks (near 2% from flow rate through the

27. Propulsion Systems

AD-606 242 Div. 27
OTS Prices: HC $3.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
RESEARCH ON THE GENERATION AND ACCELERATION OF SUBMICRON-SIZE PARTICLES.
Summary rept. for Aug 59-Feb 62,
by V. E. Krohn. 28 Feb 62, 73p STL-8937-6005-CU-000
Contract AF33 616 6775

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electric propulsion, Particles), (*Colloids, Acceleration), Drops, Production, Detectors, Electrostatics, Liquid metals, Salts, Organic compounds.

AD-606 337 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo-Wooldridge Corp., Los Angeles, Calif.
COMMENTARIES ON OPTIMIZATION OF CONSTANT THRUST ELECTRICAL PROPULSION SYSTEMS,
by Haywood Shelton. 25 Oct 56, 10p ERL-LM-101

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electric propulsion, Optimization), Rocket propulsion, Thrust, Exhaust gases, Velocity, Acceleration, Correlation techniques, Propulsion.

D. B. Langmuir has calculated the exhaust velocities that optimize the mass ratio, the time, and the velocity increment for various weight to power ratios of the power source. E. Stuhlinger has used a different optimization involving the initial acceleration. This note will attempt to clarify the relative merits of these two optimization schemes and two others that naturally evolve from the analysis.

AD-606 393 Div. 27
OTS Prices: HC $7.00/MF $1.50

Philco Research Labs., Newport Beach, Calif.
INTERNAL ENVIRONMENT OF SOLID ROCKET NOZZLES.
Final technical rept.
by F. C. Price, V. A. Marple, R. H. Williams, R. A. Dupuis, and H. L. Moody. 30 Jul 64, 302p U-2709
Contract AF04 611 9072
RPL TDR64 140

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motor nozzles, Gas flow), Rocket motors (Solid propellant), Hydrogen, Oxygen, Aluminum compounds, Oxides, Water vapor, Emissivity, Particles, Thermodynamics, Molybdenum, Exhaust gases.

Solid rocket motor nozzle environment was studied in cold flow modeling and in motor firings. The emphasis in the work was on the effects of the condensed phase in wall impingement and radiation. In motor firings using H2 - O2 - Al2O3 - H2O, emissivity values for the alumina were determined. Then radiation heat flux scaling relationships were developed for application to any size motor. Particle impingement was studied in firing with a molybdenum nozzle fitted with thermocouples from which local transient heat flux data were developed. High heat flux rates due to impingement were determined. In cold flow studies particle impingement rates and static pressure values for input to corrective analysis were determined. Analyses of heat flux modes in a large motor nozzle and in a gimballed nozzle were determined. A large part of the work involved technique development in handling micron-sized particles in firings and in cold flow. A particle sampler was developed for sampling motor exhausts. (Author)

AD-606 428 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
VIBRATIONAL CHARACTERISTICS OF SOLID PROPELLANT ROCKET ENGINES.
Semiannual rept. for 1 Nov-31 Dec 58.
31 Dec 58, 8p STL/GM-TR-0165-00591
Contract AF04 647 165

Unclassified report

Descriptors: (*Vibration, Rocket motors (Solid propellant)), (*Rocket motors (Solid propellant) Vibration), Guided missiles, Design, Cylindrical bodies, Structural shells, Automatic pilots, Damping, Shear stresses, Bonding, Pressure, Models (Simulations), Solid rocket propellants.

On 1 November 1958, an experimental program was begun to determine the longitudinal and bending dynamics of structures simulating large, solid-propellant rocket engines. Equipment was ordered, and experimental design configurations were developed. During the following twelve months, experiments were performed on specimens composed of thin, metal, cylindrical shells which surround and are bonded to a solid-propellant-like material; inert propellants were used. The purpose of these experiments was to determine the effective mass, stiffness, and damping of the propellant when the propellant-cylinder system is undergoing longitudinal and bending vibrations. (Author)

AD-606 515 Div. 27, 10
OTS Prices: HC $3.00/MF $0.75

Rocketdyne, Canoga Park, Calif.
TOTAL IMPULSE MEASURING SYSTEM FOR SOLID-PROPELLANT ROCKET ENGINE: INSTALLATION AND OPERATION HANDBOOK,
by V. C. Plane. Feb 64, 67p
Contract AF04 611 8515, Proj. 3850, Task 3850306
RPL TDR64 111

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motors (Solid propellant), Specific impulse), (*Solid rocket propellants, Thrust), Burning rate, Test equipment, Electromechanical converters, Strain gages, Electric bridges, Oscillators, Voltmeters, Digital systems, Installation, Calibration, Operation, Handbooks.

The Rocketdyne Solid Propellant Total Impulse Measurement System is an electromechanical instrument which provides very precise measurements of motor thrust and its time-integral, total impulse, at thrust levels up to 10,000 pounds. When in use, the solid propellant motor

28. Psychology and Human Engineering

AD-606 214 Div. 28
OTS Prices: HC $2.00/MF $0.75

Lockheed Aircraft Corp., Marietta, Ga.
COMBINED EFFECTS OF SLEEP LOSS AND DEMANDING WORK-REST SCHEDULES ON CREW PERFORMANCE.
Rept. for Dec 62-Mar 64,
by Earl A. Alluisi, W. Dean Chiles, and Thomas J. Hall.
Jun 64, 78p
Contract AF33 657 10506, Proj. 1710, Task 171002
AMRL TDR64 63

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Sleep, Air force personnel), (*Confinement (Psychology), Performance tests), (*Air force personnel, Performance (Human)), Confined environments, Simulation, Exercise, Pilots, Decision making, Targets.

Subjects were organized into two 5-man crews who worked alternating shifts on a schedule of 4-hours on duty and 4-hours off for the entire 12-day confinement period. In each of the other two studies, six USAF Pilots were confined for 12 days while following a schedule of 4-hours on duty and 2-hours off. The groups in each study were confined to a simulated advanced-system crew compartment; while on duty the operators were tested with a battery of six performance tasks, two of which required interactions among crewmembers in the form of exchanges of information, cooperation, and temporal coordination. During the middle two days of the 12-day confinement period, ie, on days, six and seven, the crews following the 4-4 work-rest schedule were assigned extra work that resulted in each man's remaining awake for a 44-hour period; on the same days, the crews following the 4-2 schedule were assigned extra work that resulted in each man's remaining awake for a 40-hour period. The data show that performance is generally inferior on the 4-2 schedule as compared to the 4-4 schedule and that the stress of a period of sleep loss results in generally greater performance decrements on the 4-2 than on the 4-4 schedule. The 4-2 schedule is not recommended if emergency periods involving sleep loss can be expected and a high level of performance is a critical requirement. (Author)

AD-606 298 Div. 28, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SCIENTIFIC AIDS TO DECISIONMAKING: A PERSPECTIVE,
by F. R. Collbohm. 31 Jan 57, 11p P-1032

Unclassified report

Address before the General Management Conference, American Management Association, Los Angeles, Calif.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Decision making), (*Decision making, Mathematical analysis), Management engineering, Probability, Systems engineering, Computers, Mathematical models.

Good answers to hard questions require well-designed analysis. A well-designed analysis begins with a definition of the problem, a clarifying of the objectives, and results in a breaking down of the problem into workable components to which a combination of both expert judgment and these new mathematical tools can be brought to bear to provide a sound basis for intelligent decision making.

AD-606 489 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Primate Lab., Univ. of Wisconsin, Madison.
MEASUREMENT OF DETRIMENTAL DRUG EFFECTS ON COMPLEX BEHAVIOR IN ANIMALS.
Annual progress rept no. 3 (final), 1 Jan-31 Dec 63,
by V. J. Polidora and H. F. Harlow. 31 Dec 63, 9p
Grant DA AMC18 108 59A

Unclassified report

Descriptors: (*Drugs, Behavior), (*Behavior, Drugs), (*Learning, Drugs), Monkeys, Tranquilizers, Chlorpromazine, Barbiturates, CNS stimulants, Amphetamines, Training, Conditioned reflex, Attention, Visual signals, Monitors.

The three research programs (Sequential Responses Test, Vigilance Test, and WATA) have passed through initial stages of validation. Experimental results are described. (Author)

AD-606 637 Div. 28
OTS Prices: HC $3.00/MF $0.50

Laboratory of Aviation Psychology, Ohio State Univ. Research Foundation, Columbus.
RESEARCH ON DISPLAY VARIABLES.
Final rept.,
by William C. Howell and Jerry D. Tate. Aug 64, 52p
Contract AF30 602 3066, Proj. 8501
RADC TDR64 266

Unclassified report

Descriptors: (*Display systems, Human engineering), (*Applied psychology, Display systems), (*Viewing screens, Display systems), Character recognition, Learning, Memory, Psychometrics, Visual perception, Performance (Human).

Three formal experiments were conducted on variables contributing to the accessibility, for human viewers, of information in large-scale displays. The subject observed a tabular or spatial display containing both relevant and irrelevant events in randomly assigned positions. After a controlled period of inspection he was required to report the location of relevant events; various accuracy and latency scores were recorded. Major variables of interest were; duration of inspection, amount of relevant and irrelevant information, degree of irrelevancy, kind of irrelevancy, display format, and goodness of event patterning. All results pointed toward two major conclusions: the subject increases accessibility through organization, at a peripheral level, of relevant information; storage of displayed information involves two distinct processes--one more central and permanent, the other more peripheral and temporary. Implications for display design are discussed. (Author)

AD-606 710 Div. 28
OTS Prices: HC $3.00/MF $0.50

Dunlap and Associates, Inc., Santa Monica, Calif.
TECHNIQUES FOR RELATING PERSONNEL PERFORMANCE TO SYSTEM EFFECTIVENESS CRITERIA: A CRITICAL REVIEW OF THE LITERATURE,
by A. J. Hoisman and A. M. Daitch. Sep 64, 52p
Contract Nonr4314 00

Unclassified report

slot to 60 - 70% in rigid supports working on oils) was experimentally proven. Namely thanks to small lateral leak at significant hydrodynamic flow rates through the slot a layer of lubricant of significant thickness is formed, which ensures work of the bearing with very low friction in a wide range of operating conditions, and also its long period of service. (Author)

AD-606 764 Div. 27
OTS Prices: None/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF EXHAUST PIPES OF CONDENSATION STEAM TURBINES [AND] EXPERIMENTAL INVESTIGATION OF HYDRAULIC RESISTANCE OF THE FEEDER OF A SYSTEM OF AIR COOLING OF THE ROTOR OF A GAS TURBINE,
by A. E. Zaryankin and F. Z. Ratner. 18 Feb 64, 36p
FTD MT63 192; TT 64 71499
Unclassified report

Edited machine trans. of Teploenergetika (USSR) 1963, v. 10, no. 2, p. 41-50.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Document is available in microfiche only.

Descriptors: (*Steam turbines, Exhaust pipes), (*Gas turbine rotors, Air cooled), (*Turbines, Design), Mechanical engineering, Heat engines, Vapor pressure, Mechanics, Gas turbine blades, Pressure, Cooling, USSR, Reports.

In the first article, the results of experimental investigations of exhaust pipes of condensation steam turbines for the purpose of decreasing losses in them are given. In the second article, the methodology and test results are described on the air cooling feeder system to the rotor of a gas turbine. Recommendation are given for design and calculation of similar systems.

AD-606 765 Div. 27, 9, 10
OTS Prices: None/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANALYSIS OF LOW-FREQUENCY PULSATIONS IN GAS-TURBINE COMBUSTION CHAMBERS,
by O. V. Dubrovskii. 28 May 64, 20p
FTD MT63 209; TT 64 71500
Unclassified report

Edited machine trans. of Teploenergetika (USSR) 1961, v. 8, no. 8, p. 32-37.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. Document is available in microfiche only.

Descriptors: (*Gas turbines, Combustion chambers), (*Combustion chamber gases, Oscillation), Flames, Temperature, Pressure, Fluid flow, Thermodynamics, USSR.

An experimental analysis of low-frequency temperature and pressure pulsations in the flame zones of the combustion chambers of stationary gasturbine installations was conducted with the help of specially designed equipment. The probable causes of the origin of these pulsations are established. (Author)

AD-606 818 Div. 27, 14
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
STUDY OF THE MECHANISM OF FAILURE OF ROCKET MATERIALS.
Bi-monthly rept. no. 12, rev., 1 Mar-30 Jun 60.
7 Jul 60, 12p IITRI-6030-12(R)
Contract AF33 616 3925
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motor nozzles, Failure (Mechanics)), (*Failure (Mechanics), Rocket motor nozzles), Rocket motors (Solid propellant), Metallography, X-ray diffraction analysis, Silicon coatings, Silicon compounds, Carbides, Graphite, Microstructure, Erosion, Tests, Materials.

A study was made of failure mechanisms of solid propellant rocket materials. Nozzles tested by Thiokol Chemical Corporation are considered in this report. Results of metallographic and X-ray diffraction analyses are presented for the siliconized graphite nozzles fired under Phase I. (Author)

29. Quartermaster Equipment and Supplies

AD-606 178 Div. 29
OTS Prices: HC $1.00/MF $0.50

Defense Subsistence and Supply Center, Chicago, Ill.
COMPRESSED DEHYDRATED SUBSISTENCE, GREAT BRITAIN.
Foreign material subsistence test rept.,
by John J. McMullen. 27 Jul 59, 8p
DSSC 137 59

Unclassified report

Descriptors: (*Dehydrated foods, Military rations), (*Military rations, Great Britain), Freeze drying, Vegetables, Nutrition, Storage, Packaging, Military requirements.

Six (6) compressed dehydrated subsistence items in triplicate were provided the Quartermaster Food and Container Institute for the Armed Forces by the Ministry of Agriculture, Fisheries and Food of Great Britain. The Simplified Food Logistics Program of the QMF and CI has been directing its efforts toward military subsistence items which are varied, palatable, nutritious, high in caloric density, economical in cube, light in weight, easily and quickly prepared, stable in storage under varying conditions of time, temperature and humidity, and packaged in flexible packaging material. QMF and CI efforts have been directed toward air and freeze-dried products. Although many foods lose much of their bulk on dehydration, many of them have the same or nearly the same cube after drying. British research and development has paralleled that of the QMF and CI but has gone a step further to compress their dried foods. With the exception of the broad beans, unfamiliar to the U. S. diet, and the rutabagas, not common in the general U. S. diet, the items could be incorporated into U. S. rations with fair to good acceptability.

AD-606 447 Div. 29, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMPARISON OF AMERICAN ROTARY ELECTRIC DESK CALCULATORS,
by Fred J. Gruenberger. 15 Jul 57, 18p P-1124

Unclassified report

Descriptors: (*Computers, Office equipment and supplies), (*Office equipment and supplies, Computers), Analysis, Electric motors, Performance (Engineering).

The current comparable models of the Friden, Marchant, and Monroe desk calculators are contrasted and analyzed and their relative advantages and disadvantages are listed. Attention is drawn to those features which tend to make the machines non-interchangeable. The survey was conducted with the cooperation of the local salesmen of the three firms. (Author)

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Systems engineering, Performance (Human)), (*Performance (*Human), Systems engineering), Human engineering, Standards, Effectiveness, Personnel, Models (Simulations), Weapon systems.

AD-606 825 Div. 28, 23
OTS Prices: HC $5.00/MF $1.00

Training Research Lab., Univ. of Illinois, Urbana.
TRANSFER EFFECTS WITHIN A HIERARCHICAL LEARNING TASK AS A FUNCTION OF REVIEW AND CORRECTION ON SUCCESSIVE PARTS.
Technical rept. no. 5,
by M. David Merrill. Sep 64, 156p
Contract Nonr3985 04

Unclassified report

Report on Research on Pre-Programed Self-Instruction and Self-Programed Individualized Education.
Doctoral thesis.

Descriptors: (*Learning, Teaching machines), (*Teaching machines, Learning), Education, Retention, Training, Transfer of training, Students, Feedback, Correlation techniques, Analysis of variance, Control sequences.

A common assumption is that learning and retention of a hierarchial task are both facilitated by mastering each successive part before proceeding to the next part. However, research conducted on the teaching of a complex imaginary science by means of SOCRATES, a computer-based teaching machine, contradicted this hypothesis. It was concluded that correction on lesson frames teaches cautious, slow responding with no gain in accuracy of response and that in a hierarchial task in which subjects are allowed to review during the terminal test, an attempt to ensure mastery of each successive part before proceeding to the next part by requiring the student to receive a two-stage review and correction procedure when he makes errors does not facilitate learning or retention.

AD-606 845 Div. 28, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON 'EFFICIENT ESTIMATION AND LOCAL IDENTIFICATION IN LATENT CLASS ANALYSIS',
by Albert Madansky. 24 Feb 58, 4p P-1289

Unclassified report

Descriptors: (*Psychometrics, Factor analysis), Statistical analysis, Errors, Identification.

Corrected versions of information functions stated by R. B. McHugh in his work, 'Efficient Estimation and Local Identification in Latent Class Analysis' are presented.

AD-606 260 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
RELIABILITY AND THE COMPUTER,
by Willis H. Ware. 20 Feb 57, 20p P-1008
Unclassified report

Paper presented before the Western Joint Computer Conference, Los Angeles, Calif.

Descriptors: (*Computers, Reliability (Electronics)), Analog systems, Digital computers, Circuits, Feedback.

The meaning of reliability in a computing system is examined, and the contrast between analog and digital systems in this respect is discussed. The paper reviews a few salient aspects of the computer reliability problem, and contributes perhaps a new viewpoint to some parts of the reliability question. (Author)

AD-606 295 Div. 30, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WHAT IS A SYSTEM,
by Malcolm W. Hoag. 5 Mar 57, 6p P-1035
Unclassified report

Descriptors: (*Systems engineering, Theory), (*Operations research, Decision making), (*Decision making, Operations research), Systems engineering, Management engineering, Analysis, Weapon systems.

The operation or system that is relevant depends upon the problem posed for analysis. An 'operation' or 'system' is a set of interrelated actions about which policy decisions must be made. This research seeks to find a good basis for decisions, using whatever scientific tools are appropriate.

AD-606 341 Div. 30, 18, 23
OTS Prices: HC $5.00/MF $1.00

American Inst. for Research, Pittsburgh, Pa.
OPERATIONAL SPECIFICATION FOR COMPUTER-DIRECTED INSTRUCTION IN THE OPERATIONAL TRAINING CAPABILITY QUERY LANGUAGE FOR SYSTEM 473L, U. S. AIR FORCE HEADQUARTERS,
by David P. Yens and Harris H. Shettel. Jun 64, 156p
Contract AF19 628 2935, Proj. 7682, Task 768204
ESD TDR64 511
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Command and Control systems, Air Force), (*Teaching machines, Instruction manuals), (*Programming (Computers), Teaching machines), (*Computers, Teaching machines), Programming languages, Training, Training devices, Performance tests, Operation, Air force personnel, Computer personnel, Specifications, Simulation, Display systems, Data processing systems.

This specification describes the projected Query Language Computer-Directed Instruction program which permits active onconsole training of personnel in the writing and processing of OTC Query Language statements in System 473L. The files, programs, and processes of the program and a sample computer-trainee interaction are detailed. General flow charts for a possible computer program implementing the specifications are provided, designed for the IBM 1401 or 1410 computer. (Author)

AD-606 349 Div. 30
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
SOME RECENT DEVELOPMENTS IN DIGITAL CONTROL SYSTEMS,
by E. M. Grabbe. 1957, 30p
Unclassified report

Presented at the Instrumentation and Control in the Process Industries Conference sponsored by Armour Research Foundation of Illinois Institute of Technology, 7 Feb 57. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Digital computers, Control systems), Digital systems, Data processing systems, Analog-digital computers, Computer storage devices, Input-output devices, Management engineering.

AD-606 388 Div. 30, 2, 4, 5, 14, 17, 25
OTS Prices: HC $3.00/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS,
Jun 57, 52p
PB 131 097
Unclassified report

Also available on subscription $10.00/yr.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma medium, High-temperature research), (*Nuclear physics laboratories, Calibration), (*Nuclear reactors, Critical assemblies), Helicopters, Astronomy, Astrophysics, Chemistry, Mechanics, Metallurgy, Ceramic materials, Nuclear physics, Atoms, Solid state physics, Radio communication systems.

Complete papers: High-temperature plasmas; The NRL Radiation Calibration Laboratory; and Calculation of the critical mass of the NRL reactor. Summaries are given of research in the following fields: astronomy and astrophysics, chemistry, mechanics, metallurgy and ceramics, nuclear and atomic physics, radio, and solid-state physics.

AD-606 397 Div. 30
OTS Prices: HC $4.00/MF $1.00

Air Force Missile Development Center, Holloman AFB, N. Mex.
DATA REDUCTION REPORT OF SPACE-TIME SLED DATA,
by Robert G. Tantzen. 20 Jan 60, 129p
Proj. 107A2
AFMDC Misc60 1 3
Unclassified report

Descriptors: (*Rocket-propelled sleds, Statistical data), Tables, Time, Velocity, Acceleration, Least squares methods.

The paper is the data reduction of the space-time system for a particular sled run on the Holloman Track. It contains a listing of the recorded times the sled passed interrupters placed at 13-foot intervals along the track. These raw times are smoothed by a least squares process. Velocities and accelerations are computed and listed at 13-foot intervals. Explanations of computation procedures and confidence limits are given. Graphs of velocity and acceleration are included. (Author)

30. Research and Research Equipment

AD-606 173 Div. 30, 18
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
SYSTEM SIMULATION: A CONCEPTUAL APPROACH.
Scientific rept.,
by R. I. Ribler. 17 Aug 64, 18p SP-1673
Unclassified report

Descriptors: (*Programming (Computers), Data processing systems), (*Computers, Simulation), Systems engineering, Operations research, Air force operations, Training, Analysis, Tests.

AD-606 175 Div. 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
PRELIMINARY ANALYSES OF TIME-SHARED COMPUTER OPERATION.
Scientific rept.,
by E. G. Coffman, Jr. and B. Krishnamoorthi.
19 Aug 64, 36p SP-1719
Contract SD-97
Unclassified report

Descriptors: (*Computers, Scheduling), (*Programming (Computers), Operations research), Operation, Analysis, Mathematical models.

Several models of time-shared computer operation were studied. Along with this ongoing work, statistics were also compiled on the operation of the Time-Sharing System itself. It is the purpose of the paper to present preliminary results of these efforts and to discuss problems of designing scheduling algorithms for time-shared computer systems. (Author)

AD-606 177 Div. 30, 8, 18
OTS Prices: HC $1.00/MF $0.50

Navy Electronics Lab., San Diego, Calif.
THE USE OF A GENERAL PURPOSE DIGITAL COMPUTER IN A DYNAMIC CONTROL SYSTEM.
Research and development rept. for 26 Jun 61-28 Feb 62,
by W. J. Dejka and J. B. Slaughter. 7 Mar 62, 50p
Proj. SS192 001, Tasks 2, NEL N4 13
NEL 1103
Unclassified report

Descriptors: (*Control systems, Digital systems), (*Digital computers, Control systems), Control, Real time, Dynamics, Tests, Programming (Computers), Mathematical models, Integral transforms, Simulation, Analog computers.

A study was made to develop a high order of professional competence in the field of sampled-data control systems employing general-purpose digital computers. Digital computer programs were derived based on analytical studies performed using z-transforms and z-plane root loci to produce specified responses of a plant to standard step and ramp function test inputs. Tests were conducted that verified the fundamental theory of sampled-data control techniques. Plans for future work are outlined. (Author)

AD-606 199 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTRODUCTION TO ELECTRONIC COMPUTERS. CHAPTER 9, SCALING,
by F. J. Gruenberger and D. D. McCracke.
Jan 62, 14p P-2518
Unclassified report

Descriptors: (*Computers, Textbooks), Mathematics, Digital computers, Compilers, Control sequences, Data storage systems, Operation, Numbers.

Scaling, the method of keeping track of decimal points in computer arithmetical operations, is introduced. Locating decimal points by proper instructions is discussed.

AD-606 241 Div. 30, 9, 12
OTS Prices: HC $4.00/MF $0.75

Space Technology Labs., Inc., Los Angeles, Calif.
HIGH MACH NUMBER AND MATERIALS RESEARCH PROGRAM.
Semi-annual rept. for 1 Jan-30 Jun 59,
by J. A. Laurmann. 30 Jun 59, 102p
STL/TR-59-0000-00708
Contract AF04 647 309
Unclassified report

Descriptors: (*Hyersonic wind tunnels, Shock (Mechanics)), Design, Enthalpy, Gas flow, Density, Reentry vehicles, Test facilities, Electric arcs, Shock tubes, Hypersonic nozzles, Plasma jets, Diaphragms (Mechanics), Instrumentation, Velocity, Electrodes, Heat transfer, Boundary layer, Calibration.

During the period 1 January 1959 to 30 June 1959, the development and testing of equipment was continued. A double diaphragm system was developed for the hypersonic shock tunnel. Experiments with the arc-heated driver were continued to obtain information concerning driver temperatures and pressures. Arc tunnel tests were continued. Primary emphasis was placed on the development of flow calibration techniques. The design of a large-scale arc unit (1.5 megawatts) was completed. (Author)

AD-606 252 Div. 30, 8, 25
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 2. SYSTEMS.
Quarterly progress rept. for 1 Nov 62-31 Jan 63,
by C. R. Wieser and S. H. Dodd. 15 Feb 63, 17p
Contract AF19 628 500
Unclassified report

Descriptors: (*Data processing systems, Design), (*Communication theory, Electronics), (*Optics, Scientific research), Radar range computers, Programming languages, Digital systems, Demodulation, Lasers, Fluorescence, Infrared research, Models (Simulations), Crystals, Theory.

This progress report covers the fields of Systems Analysis, Communications, and Optics and Infrared research. Included are articles on digital system design, estimation and control, data processing and systems design, modulation and detection theory, channel characterization, ruby laser research, fluorescence of excited neodymium glass, and irradiation effects in alkaline earth fluorides.

Prepared in cooperation with Stanford Univ. and presented at the Data Processing and Management Information Conference, Mass. Inst. of Tech., 15-19 Jul 57.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Data processing systems), (*Decision theory, Data processing systems), Probability, Costs, Statistical analysis, Decision making, Economics, Game theory, Equations, Sampling, Experimental data, Mathematical prediction, Dynamic programming.

The advance which decision theory makes over previous methods in mathematical statistics is that the economic consequences of an action are explicitly taken into account. In other words, the theory goes beyond statements about probabilities of making various errors, and incorporates both the relative losses from such errors as well as the costs of processing information in order to reduce the likelihood of mistakes. One important consequence claimed by decision theorists is that by such analysis it is possible to unify various subfields in statistics into a single conceptual framework.

AD-606 549 Div. 30
OTS Prices: HC $2.00/MF $0.50

Air Force Missile Development Center, Holloman AFB, N. Mex.
VIBRATION ANALYSIS N5B SLED RUN NO. 128-H ON 28 OCTOBER 1959,
by Cosimo D. Abbate. Nov 59, 43p
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Rocket-propelled sleds, Vibration), Experimental data, Tables.

Power spectral density tables are given for vibrations measured in the X-, Y-, and Z-axes of the platform and sled attach points.

AD-606 554 Div. 30, 10, 27
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
SAFETY REGULATIONS FOR SNORT LIQUID-PROPELLED SLEDS,
by James P. Judin. 1 Jul 57, 26p
Unclassified report

Descriptors: (*Rocket-propelled sleds, Safety), Rocket motors (Liquid propellant), Jet engine fuels, Liquid rocket fuels, Liquid rocket oxidizers, Nitric acid, Handling, Fire safety, Protective clothing, Launching, Abort.

The safety rules and regulations set forth in the manual prescribe methods and practices for insuring continuity of production, safeguarding personnel, and preventing property damage. The mandatory requirements and advisory provisions set forth apply to the Supersonic Track Division and the snort facility, where the Test Department is charged with the responsibility for safety. (Author)

AD-606 557 Div. 30, 27
OTS Prices: HC $3.00/MF $0.75

Rocketdyne, Canoga Park, Calif.
TOTAL IMPULSE MEASURING SYSTEM FOR SOLID PROPELLANT ROCKET ENGINE.
Phase 2 rept.,
by V. C. Plane. Mar 64, rev. Aug 64, 67p
Rocketdyne-R-5602
Contract AF04 611 8515, Proj. 3850, Task 3850306
RPL TDR64 109
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Thrust, Rocket motors (Solid) propellant), (*Test equipment, Rocket propulsion), (*Rocket motors (Solid propellant), Thrust), Captive tests, Design, Test methods, Instrumentation, Mathematical models, Measurement.

Discussion and results of the two main considerations comprising the intermediate (Phase II) effort are presented: (1) fabrication and test of the component parts of the system prior to their inclusion in the system; and (2) assembly and test of the complete measurement system prior to its delivery to EAFB. Specific results of these separate but related program efforts are, respectively: (1) source inspections and tests, where needed, to determine compliance with Rocketdyne drawings and specifications, and (2) alignment measurements and detailed tests to determine that the overall system performance conformed to the contractual requirement of 0.1% accuracy. (Author)

AD-606 574 Div. 30
OTS Prices: HC $7.35/MF $2.00

Westinghouse Defense and Space Center, Baltimore, Md.
PARALLEL NETWORK COMPUTER (SOLOMON).
Final rept. vol. 2, pt. 1.
Aug 64, 433p WDSC-406A2, v. 2, pt. 1
Contract AF30 602 2724, Proj. 5581, Task 558109
RADC TDR63 261 V2 P1
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-419 318.

Descriptors: (*Computers, Design), Control systems, Computer logic, Computer storage devices, Computer languages, Programming (Computers), Circuits, Instruction manuals.

A detailed description is given of the design of the SOLOMON Computer. The introduction provides a general description of SOLOMON and its various components. Subsequent discussions describe in more detail each functional unit in the system (i.e., The PE Network, The Network Control Unit (NCU), etc), and their subunits (i.e., Adders, Decoding, Network, etc). A detailed description of each operation and its timing is provided. A circuit diagram of all logical elements to be employed in the system is provided. (Author)

AD-606 577 Div. 30
OTS Prices: HC $5.00/MF $1.00

Westinghouse Defense and Space Center, Baltimore, Md.
PARALLEL NETWORK COMPUTER (SOLOMON).
Final rept. vol. 2, pt. 2.
Aug 64, 165p WDSC-406A2, v. 2, pt. 2
Contract AF30 602 2724, Proj. 5581, Task 558109
RADC TDR63 261 V2 P2
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy, see also AD-606 574.

AD-606 404 Div. 30, 8
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
TEMPERATURE COMPENSATION AND IMPROVEMENT OF THE NRL THERMISTOR-BRIDGE GAS LEAK DETECTOR,
by P. T. Stine and R. E. Koncen. 13 Aug 64, 58p
Proj. SP69422
NRL 6132
Unclassified report

Descriptors: (*Gas detectors, Design), Gas leaks, Determination, Thermal conductivity, Thermistors, Electric bridges, Sensitivity, Performance (Engineering).

The NRL thermistor-bridge gas leak detector is a portable electronic device having wide utility for the location of leaks from pressurized systems containing gas or gases having a thermal conductivity different from that of the ambient air. The effects of ambient temperature variations upon its sensitivity are discussed, and simple design modifications are prescribed to provide effective temperature compensation and a significant improvement in sensitivity. The recommended design modifications are expected to greatly enhance its performance capabilities for applications at lowered temperatures such as may be encountered aboard surface ships and at shore establishments. . (Author)

AD-606 411 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTRODUCTION TO ELECTRONIC COMPUTERS: APPENDIX 2: DIVISION,
by F. J. Gruenberger and D. D. McCracken. Feb 62, 10p P-2530
Unclassified report

Descriptors: (*Computers, Textbooks), Mathematics, Numbers, Compilers, Computer logic, Digital computers, Programming (Computers), Operation.

The construction and operation of a computer subroutine for the purpose of division is presented.

AD-606 456 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A COMMENTARY ON FIRE RESEARCH, BASED ON THE MASS FIRE STUDY GROUP CONFERENCE, THE UNIVERSITY OF CALIFORNIA AT LOS ANGELES (MAY 26-28, 1957),
by James C. DeHaven. 24 Jul 57, 15p P-1140RC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fire safety, Symposia), Fires, Chemical properties, Physical properties.

A commentary on the Conference suggesting research which might usefully be undertaken based on the description and discussion of hostile fires presented by the practical fire fighters.

AD-606 460 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DIGITAL COMPUTER PROGRAMMING; A BOOK REVIEW,
by Charles L. Baker. 5 Aug 57, 19p P-1145
Unclassified report

A review of the book Digital Computer Programming, pub. by D. D. McCracken, Wiley and Sons, New York, 1957. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming (Computers), Digital computers), (*Digital computers, Programming (Computers)), Textbooks, Reviews, Mathematics, Compilers, Input-output devices, Programmers, Operation

A book review is presented which covers the book chapter by chapter and, in general, points up some of the short comings from the point of view of a neophyte in coding. A few remarks on the general philosophy of the book, which is described as an excellent introduction to the problems of coding for a high speed stored program computer, are presented. .

AD-606 509 Div. 30, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE COMBINATION OF ALTERNATIVE RESEARCH TECHNIQUES IN LOSITICS SYSTEMS ANALYSIS,
by Murray A. Geisler and Wilbur A. Steger. Nov 62, 24p P-2660
Unclassified report

Prepared for presentation at the Annual Meeting of the American Association for the Advancement of Science, Philadelphia, Pa., 26-31 Dec 62.

Descriptors: (*Symposia, Operations research), (*Management engineering, Inventory control), (*Inventory control, Systems engineering), Simulation, Costs, Inventory analysis, Decision making, Game theory, Data processing systems, Logistics.

The purpose of this paper is to examine the nature of systems analysis, and past experiences with it, to help develop a strategy for selecting appropriate techniques. To facilitate the development of this strategy, several categorizations are developed: (1) of the characteristics of the kinds of systems studied by systems analysts; (2) of the many purposes of systems analysis; and (3) of the attributes of many systems analysis techniques. Then the simulation category is examined further with a more detailed breakdown presented on the spectrum of simulation techniques. Finally, an illustration is given of the way in which the various systems analysis techniques have been used to evolve a greater understanding of supply and inventory policies and systems.

AD-606 527 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STATISTICAL DECISION THEORY AS A GUIDE TO INFORMATION PROCESSING,
by Harvey M. Wagner. 26 Aug 57, 30p P-1160
Unclassified report

Prepared in cooperation with I. B. M. Corp., Poughkeepsie, New York.

Descriptors: (*Programming (Computers), Programming languages), Computers, Compilers, Programmers, Operation.

The SHARE 709 system permits the programmer to communicate with the machine and with itself entirely in a symbolic language. The compiler specifications including instruction format, pseudo operations, program library, and system and programmer-macro operation generators are described. The methods for handling symbolic input/output, symbolic debugging, and symbolic modification of a compiled program are discussed. (Author)

AD-606 627 Div. 30
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
A COMMAND STRUCTURE FOR COMPLEX INFORMATION PROCESSING,
by J. C. Shaw, A. Newell, H. A. Simon, and T. O. Ellis.
20 Aug 58, 62p P-1277
PB 164 088

Unclassified report

Presented at the Western Joint Computer Conference, Los Angeles, 6 May 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Programming languages, Digital computers), (*Control sequences, Programming languages), Theorems, Programming (Computers), Data processing systems, Data storage systems, Input-output devices.

Recent research into digital computer programs for discovering proofs to theorems in symbolic logic and playing chess has shown the desirability of languages better adapted to the requirements of such non-numeric programming tasks than are present day machine languages. A command structure which allows more indirectness in programming and requires less knowledge of the location and form of the data is described. (Author)

AD-606 642 Div. 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RESEARCHER AND THE MANAGER: A DIALECTIC OF IMPLEMENTATION,
by A. H. Schainblatt and C. W. Churchman. Sep 64,
38p P-2984

Unclassified report

Descriptors: (*Operations research, Management engineering), (*Management engineering, Operations research), Research program administration, Decision making.

The purpose of this paper is to review various opinions and differences of opinion which have been expressed concerning that aspect of research referred to as 'implementation'. The term 'implementation' is used to refer to the manner in which the results of scientific effort may come to be used by the manager. The 'problem of implementation' is the problem of determining what activities of the scientist and the manager are most appropriate to bring about an effective relationship between the two. The examination of what operations researchers and social scientists have had to say about the relationship between manager and scientist has yielded four rather distinct ideas. We call these four concepts the separate-function position, the communication position, the persuasion position, and the mutual understanding position.

AD-606 652 Div. 30
OTS Prices: HC $3.00/MF $0.75

Aerospace Systems Div., Radio Corp. of America, Burlington, Mass.
MODULAR ARITHMETIC COMPUTER RESEARCH.
Final rept.
1 Apr 64, 78p
Contract AF33 657 7987, Proj. 7062, Task 706205
AL TDR64 86

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Digital computers, Design), Computer storage devices, Computer logic, Circuits, Transistors, Modules (Electronics), Programming (Computers), Input-output devices, Control panels, Mathematical programming.

The design of a general-purpose digital computer that performs arithmetic operations in the residue number system is described. The residue number system provides a solution to a prime problem in the design of an arithmetic unit, obtaining a fast multiply operation at a reasonable cost. In the implemented design, the execution times of addition, subtraction and multiplication are the same. The arithmetic unit is implemented with transistor logic circuits based on the use of directly coupled complementary transistors and contains about 1500 transistors for three registers, the decoders, matrices, encoders and special control circuits. The equivalent word length of the arithmetic unit is slightly in excess of fifteen binary digits. (Author)

AD-606 661 Div. 30, 15
OTS Prices: HC $4.00/MF $0.75

Stanford Electronics Labs., Stanford Univ., Calif.
A COMPUTER-ORIENTED STUDY OF PERFORMANCE FEEDBACK IN SAMPLED-DATA CONTROL SYSTEMS,
by John P. Mantey. Jul 64, 114p SEL-64-085, SEL-TR-6312-1
Contract N123 953 32163A

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Control systems, Feedback), (*Mathematical models, Control systems), Servomechanisms, Optimization, Synthesis, Stability, Search theory, Performance (Engineering), Numerical analysis, Operations research, Transients, Computers, Dynamics.

This research is concerned with the development of computer-oriented procedures for the design of sampled-data control systems. Two general areas of this problem are considered: the synthesis of optimal controllers having low dynamical order, and the design of adaptive control systems. The performance of the system is evaluated in terms of a quantitative performance criterion. Two new performance criteria are developed; the mean-quadratic-error criterion and the average rate-of-decay criterion. Since the primary requirement of a dynamical system is stability, these criteria are examined in terms of the theorems from Liapunov's direct method of stability analysis. The analysis of the rate criterion may be applied to nonlinear as well as linear systems. Included in the discussion are illustrations on how some of the qualitative performance criteria, such as 'good' transient response, may be satisfied through proper selection of the mathematical performance criterion. The optimization procedures are based upon the concept of performance feedback in which the evaluated performance of the system is used directly in the adjustment of the system parameters.

Descriptors: (*Computers, Programming (Computers)), Computer logic, Computer languages, Computer storage devices, Instruction manuals.

The functional capabilities of SOLOMON are described from a programmers point of view. General programming information along with a functional description of each unit and a detail description of each available instruction is provided. The instruction list includes the PE Network Instructions, the Network Control Unit, Unit Control Instruction, the Network Control Unit Arithmetic Instruction, and the Input-Output Instruction. (Author)

AD-606 578 Div. 30
OTS Prices: HC $7.00/MF $1.50

Westinghouse Defense and Space Center, Baltimore, Md.
PARALLEL NETWORK COMPUTER (SOLOMON) APPLICATIONS ANALYSES.
Final rept. vol. 3.
Aug 64, 313p WDSC-406A2, v. 3
Contract AF30 602 2724, Proj. 5581, Task 558109
RADC TDR63 261 V3
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy, see also AD-606 577.

Descriptors: (*Computers, Operation), (*Data processing systems, Analysis), Cybernetics, Artificial intelligence, Computer logic, Nonlinear systems, Combat noise, Acoustic detectors, Simulation, Transportation, Pattern recognition, Photointerpretation, Hydrodynamics, Diffusion, Inventory control, Communication systems, Weather forecasting.

The volume presents the study of the applicability of the SOLOMON Parallel Network computer system to ten varied problem areas. The report, where possible, contrasts the running time of SOLOMON with the running time of a commonly-used conventionally-organized computer in the solution of each problem. The conclusions drawn indicate that the SOLOMON system offers speed advantages of from one to three orders of magnitude in these major data processing problem areas. (Author)

AD-606 604 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONTRASTS IN LARGE FILE MEMORIES FOR LARGE SCALE COMPUTERS,
by John A. Postley. 27 Mar 58, 8p P-1230
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Computer storage devices, Digital computers), Performance (Engineering), Control systems, Analysis, Magnetic tapes.

The increasing requirement for very large files in digital computer systems has lead to the identification of several important characteristics of these files, and to the development of files which exhibit these characteristics in varying degrees. As a result, a new situation has been created wherein a detailed study of these characteristics will now be necessary in some applications to determine the particular file most suitable for the problem or problems to be dealt with.

AD-606 608 Div. 30, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FIRST APPROACH TO LOGISTICS SYSTEM SIMULATION,
by Murray A. Geisler. 16 Dec 57, 18p P-1234
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Management engineering, Logistics), (*Air force systems command, Simulation), (*Logistics, Air force systems command), Systems engineering, Decision making, Data processing systems, Inventory control, Weapon systems, Communication systems, Aircraft, Maintenance, Punched cards, Air force personnel.

To help reduce the difficulties between invention and implementation, RAND has established a Logistics Systems Laboratory with Air Force support. This laboratory is intended to test and develop improved logistics policies by providing realistic environments in which these new concepts must function. Such experiments are intended to provide information on the data flow systems, organizational changes, and other system effects that would be required to use the proposed policy. In this way, it is hoped that the implementation of such proposals can be accelerated. In this paper, some of the early work of the Logistics Systems Laboratory is presented. A simulation of an Air Force logistics system is described. This system is concerned with providing spare parts to several bases at which aircraft are flown and maintained. This first exercise of the laboratory was intended primarily to give information about the problems of laboratory simulation.

AD-606 617 Div. 30, 8
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN ELECTRONICS ENGINEER'S VIEW OF OPERATIONS RESEARCH,
by James F. Digby. 13 May 58, 12p P-1254
Unclassified report

Presented at the National Conference on Aeronautical Electronics, Dayton, Ohio, 13 May 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Operations research, Electronics), Electronics, Operations research), Background, Theory, Queueing theory, Monte Carlo method, Mathematical programming, Search theory, Game theory, Decision theory, Simulation, Analysis, Engineering personnel.

The use of operations research in electronics is explored. The history and techniques of operations research are presented.

AD-606 624 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PROGRAMMING AND MODIFICATION IN THE SHARE 709 SYSTEM,
by Irwin D. Greenwald and Maureen Kane. 19 Mar 58, 16p P-1273
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear physics laboratories, Design), (*Algae, Growth), Reactor materials, Radiation damage, Pressure, Oxygen, Chemistry, Mechanics, Metallurgy, Ceramic materials, Optics, Radio communication systems, Solid state physics.

Complete papers: The NRL high level radiation laboratory; and Pressure as a factor in algae growth. Summaries are given of research in the following fields: chemistry, mechanics, metallurgy and ceramics, optics, radio, and solid state physics.

AD-606 815 Div. 30, 8
OTS Prices: HC $2.00/MF $0.50

Motorola, Inc., Scottsdale, Ariz.
STUDY OF ELECTRONIC EQUIPMENT LIFE PREDICTION.

Quarterly progress rept. no. 4, 1 May-31 Jul 60, by A. T. Kneale, L. R. Corbett, and I. Ray. 31 Jul 60, 31p
Contract DA36 039sc78952 Unclassified report

Descriptors: (*Electronic equipment, Life expectancy), (*Instrumentation, Feasibility studies), Reliability (Electronics), Performance (Engineering), Probability, Statistical analysis, Tensor analysis, Matrix algebra, Design, Models (Simulations).

The purpose of this study is to determine the feasibility of providing instrumentation capable of deriving a quantitative expression for the rate of degradation of performance of electronic equipment. The rate of degradation is to be measured directly on an individual electronic equipment and expressed in terms of operating-time-remaining until failure. The major work accomplished during the quarter was: Development and illustration of the tensor concept and the analytical model, with particular regard to their use preliminary to computer programing; further refinement of the functional design of the prediction system; and, continued circuit analysis of the AN/PRC-9 equipment to confirm the approach used to determine the least number of measurable parameters required for prediction on this radio set.

AD-606 664 Div. 30, 17
OTS Prices: HC $2.00/MF $0.50

Watervliet Arsenal, N. Y.
EVALUATION OF THE PRECRACKED CHARPY TEST AS A METHOD OF DETERMINING FRACTURE TOUGHNESS OF HIGH STRENGTH STEEL ALLOYS,
by Keh Chang Wu and Vito J. Colangelo. Jul 64, 50p
WVT ID6413
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Test methods, Steel), (*Steel, Toughness), (*Fracture (Mechanics, Toughness), Alloys, Manganese alloys, Silicon alloys, Chromium alloys, Nickel alloys, Molybdenum alloys, Austenite, Heat treatment, Hardness, Mechanical properties.

Precracked Charpy test specimens were prepared from three consumable electrode melted high strength sheet alloys, AISI 4340, Ladish D6AC and Unimach II. These specimens were subjected to various austenitizing and tempering conditions and tested at 78F and -40F. Fracture toughness of these steels, as determined by this method, was compared at various strength levels.

AD-606 678 Div. 30, 4, 17
OTS Prices: HC $1.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
AUTOMATIC POLARIZATION APPARATUS.
Scientific rept. no. 3,
by B. E. Wilde and N. D. Greene. 15 Jun 64, 18p
Contract AF19 604 8377, Proj. 6694, Task 669406
AFCRL 64 518
Unclassified report

Descriptors: (*Electrolysis, Polarization), (Polarization, Recording systems), (Laboratory equipment, Polarization), Reaction kinetics, Recording paper, Hysteresis, Metals, Corrosion.

An apparatus which automatically measures and records anodic and cathodic polarization curves on semi-logarithmic coordinate paper is described. Conventional and potentiostatic measurements can be performed at potential sweep rates between 0.02 and 900 volts/hour reproducible within ± 1%. (Author)

AD-606 687 Div. 30, 9, 31
OTS Prices: HC $3.00/MF $0.50

Saint Anthony Falls Hydraulic Lab., Univ. of Minnesota, Minneapolis.
A WATER TUNNEL AIR CONTENT METER.
Rept. for Oct 62-Feb 64
by John M. Killen and John F. Ripken. Feb 64, 54p SAFHL-PR-70
Contract Nonr710 42, Proj. S R009 01 01
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cavitation, Model tests), (*Bubbles, Water tunnels), (*Waters tunnels, Bubbles), (*Test methods, Bubbles), Cavitation, Measurement, Transducers, Hydrophones, Under water sound, Attenuation, Mathematical models, Air, Test equipment, Test methods, Meters.

This paper describes a system for measuring the size and concentration of free air bubble nuclei in the limited ranges of size and concentration thought to exist in a water tunnel. The system is based on measuring the amplitude attenuation of an acoustic pulse of sound as it is propagated across a water tunnel test section. An arbitrary method is proposed for converting the measured sound attenuation into size and concentration of air bubbles. (Author)

AD-606 693 Div. 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTRODUCTION TO ELECTRONIC COMPUTERS, CHAPTER 16, GENERATORS,
by F. J. Gruenberger and D. D. McCracken.
Mar 62, 18p P-2560
Unclassified report

Descriptors: (*Computers, Textbooks), Programming (Computers), Compilers, Magnetic tape, Computer storage devices, Punched tape, Data processing systems, Operation.

The generator, a device which can be designed to create computer instructions or routines and execute them, is introduced. Characteristics of magnetic tape as a storage device for these instructions are discussed and a sample problem is presented.

AD-606 697 Div. 30, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PROGRAMMING LANGUAGE SELECTION FOR COMMAND AND CONTROL APPLICATIONS,
by J. P. Haverty. Sep 64, 30p
P-2967
Unclassified report

Prepared for presentation at the Symposium on Computer Programming for Military Systems, sponsored by SHAPE Technical Centre, Hague, Netherlands, 28 Sep-2 Oct 64.

Descriptors: (*Programming languages, Command and control systems), (*Command and control systems, Programming languages), Programming (Computers), Compilers, Effectiveness, Standardization, Systems engineering.

The paper discusses the major considerations involved in selecting a programming language for command and control applications. These considerations are divided into two major categories: (a) System considerations, (b) Language and compiler requirements. Following this discussion, the difficulties of programming language selection are illustrated by citing recent American work in measuring programming language effectiveness. Some conclusions are drawn. Finally, important considerations in standardization are mentioned. (Author)

AD-606 809 Div. 30, 5, 14, 16, 17, 20, 25
OTS Prices: HC $3.00/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Sep 64, 52p Unclassified report

AD-606 803 Div. 31, 9
OTS Prices: HC $4.00/MF $0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HYDRODYNAMICS AND STABILITY AND CONTROL OF A TANDEM PROPELLER SUBMARINE.
Final rept., phase 3, Sep 63-Sep 64,
by Roy S. Rice and William G. Wilson. Sep 64, 121p
CAL-AG-1634-V-5
Contract Nonr3659 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Submarines, Model tests), (*Variable-pitch propellers, Submarines), (*Hydrodynamics, Submarines), Stability, Control, Feasibility studies, Propellers (Marine), Control systems.

The tandem propeller concept of submarine propulsion and control provides for the generation of all required forces and moments in a pair of large hub-to-tip diameter ratio propellers with collectively and cyclically movable blades. The feasibility of the concept has been demonstrated by the results of a free-running model test program. The results of earlier studies, including captive model tests, have been combined to develop a controllable free-running model system on which maneuverability and controllability data in the counter-thrusting mode of operation have been obtained. Nonlinear effects in the control forces and moments required the development of a specialized control system to produce pure vehicular motions in response to pure input commands. The control system requirements are further complicated by the basic static instability of the uncontrolled vehicle even at moderate speeds. The hydrodynamic characteristics of the vehicle and the control system design are discussed in detail. Analyses of the free-running test data attest to the efficacy of the system employed. An appendix in which the mechanical and electrical designs of equipment used in the test program is provided. (Author)

AD-606 804 Div. 31
OTS Prices: HC $2.00/MF $0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
TANDEM PROPELLER SUBMARINE PROGRAMS.
Summary rept. for Oct 61-Jun 64,
by Roy S. Rice, Jr. and William G. Wilson. Jun 64,
44p CAL-AG-1634-V-4
Contract Nonr3659 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Submarines, Underwater propulsion), (*Propellers (Marine), Submarines), Model tests, Design, Maneuverability, Propeller noise, Feasibility studies.

The Tandem Propeller Submarine concept provides a new and useful means for the propulsion and control of underwater vehicles. The principles of operation are briefly outlined and the results of feasibility studies by several contractors are reviewed. A description of the equipment used in a free-running model test program together with discussions of some qualitative results of these tests is presented. A bibliography of reports relating to the program is included. (Author)

AD-606 835 Div. 31
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
A LIFTING SURFACE APPROACH TO PLANING BOAT DESIGN,
by Eugene P. Clement. Sep 64, 20p
Proj. SR009 01 01
DTMB 1902

Unclassified report

Descriptors: (*Boats, Design), Planing surfaces, Lift, Drag, Hydrofoil boats, Configuration, Performance (Engineering).

The utilization of a design approach for a planing boat similar to that followed in the design of a hydrofoil boat or an airplane leads to a new, more efficient type of planing boat configuration. The lift-drag ratio of the new configuration is approximately 50 percent greater than that of the conventional stepless planing boat. (Author)

31. Ships and Marine Equipment

AD-606 195 Div. 31
OTS Prices: HC $3.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
EXTREME VALUE ANALYSIS OF SHIP VIBRATION,
by Virgil S. Hardy. Aug 64, 55p
DTMB 1884

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Submarine hulls, Vibration), Tolerances (Mechanics), Ship hulls, Ships, Submarines, Statistical processes, Statistical functions, Probability, Mathematical analysis.

This report presents a statistical method for establishing tolerance limits (vibration levels) for ship vibration. The method is distribution free. That is, the distribution is not required. The only requirements are, random data and a continuous frequency function. Theory is presented which establishes a distribution function that gives the probability that a proportion, such as 95 percent or more, of the population will be included between the extreme values of the sample. The theory is used in this analysis to determine limits for samples of longitudinal vibration recorded at the stern of a submarine for conditions existing during straight-course, steady-speed runs. The runs were made at different shaft rpm, and one sample was taken of the vibration during each run. The samples were assumed to have come from different populations. Probability limits are plotted for the 95-percent fraction of each population represented by the samples. These limits are compared with corresponding limits established by normal theory. (Author)

AD-606 276 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Institute of Engineering Research, Univ. of California, Berkeley.
SHIP RESISTANCE IN UNIFORM WAVES,
by O. J. Sibul. Jan 64, 80p NA-64-1
Contract Nonr222 18, Proj. S R009 01 01

Unclassified report

Descriptors: (*Ships, Fluid dynamic properties), (*Water waves, Ships), Ship models, Tests, Drag, Motion, Mathematical analysis.

Several ship models were tested in uniform waves. Motions as well as resistances were measured in more than 2,500 individual tests. The ratios of wave length to ship length of 0.75, 1.00, 1.25, and 1.50 were covered. The wave steepness was varied between 1:15 and 1:70 for each of the wave lengths. The speed range for testing was between Froude numbers of 0 and 0.35. Still water resistances were measured in separate experiments and the added resistance due to the oncoming waves derived by subtracting the still-water resistance from the total resistance in waves. The results indicate that the added resistance depends upon the block coefficient, the speed of the ship, and the steepness of the waves. It has a maximum in the vicinity of the maximum motions and decreases again for the higher speeds. The added resistance reaches higher values per unit displacement for smaller block coefficients. (Author)

AD-606 403 Div. 31, 4, 16
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.
NUCLEAR SUBMARINE ATMOSPHERES. PART 3. AROMATIC HYDROCARBON CONTENT,
by J. E. Johnson, A. J. Chiantella, W. D. Smith, and M. E. Umstead. 24 Aug 64, 46p
Projs. SF013 08 03 4092, SF013 08 03 4093
NRL 6131

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nuclear powered vessels, Submarines), (*Submarines, Air pollution), (*Aromatic compounds, Air pollution), Hydrocarbons, Oils, Chromatographic analysis, Impurities, Monitors, Solvents, Fuel oil.

A detailed analytical study has been directed to the identification and determination of the amounts of aromatic hydrocarbons present in nuclear submarine atmospheres. Many individual aromatic hydrocarbons have been identified and their occurrence in a number of nuclear submarines has been established. The hydrocarbon oil samples were desorbed from activated carbon which had been exposed in nuclear submarine atmospheres. The aromatic hydrocarbon content of these oils was found to be approximately 25 to 30 percent of the total. The quantitative distribution of individual aromatic hydrocarbons was very similar from submarine to submarine with this distribution strikingly similar to that of typical petroleum distillates in the same boiling range. (Author)

AD-606 488 Div. 31, 17, 19
OTS Prices: HC $1.00/MF $0.50

Alloyd Research Corp., Watertown, Mass.
AN INVESTIGATION OF SPIN AXIS INSTRUMENT BEARINGS.
Interim rept.,
by Donald A. Hay and Ernest Rabinowicz. 31 May 59, 22p
Contract NObs72364

Unclassified report

The original document contains color, but distribution copies are available in black-and-white reproduction only.

Descriptors: (*Gyroscopes, Bearings), (*Bearings, Failure (Mechanics)), Visual inspection, Microscopy, Metals, Materials, Contamination, Lubricants, Polarization, Illumination, Friction, Abrasives, Polymerization.

As a part of the program undertaken in this laboratory, aimed at the development of better materials for spin-axis instrument bearings, there has been underway a continuous investigation into the causes of failure of spin-axis bearings. The examination of these bearings have indicated two distinct types of bearing failure: Metal failure and lubrication failure. The method commonly employed to examine bearing components for dirt and foreign matter, is visual inspection using a stereo microscope at magnification of twenty to forty times with a standard light source. In an attempt to improve the resolution, for inspection of the bearing surfaces, other microscope techniques were tried such as dark field, interference microscopy, and polarized light. It was found that polarized light revealed particles on the surfaces of bearings which were transparent and, therefore, invisible by other lighting techniques.

of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Commerce, Mathematical models), (*Economics, Commerce), Political science.

The purpose here is (a) to develop a theory of the monopoly firm seeking to maximize profit but subject to a constraint on its rate of return and (b) to apply the model to one particular regulated industry -- the U. S. telephone industry.

AD-606 197 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PROBABILITY AND THE LIBRARY PROBLEM,
by M. E. Maron. Jan 62, 22p P-2471
Unclassified report

Descriptors: (*Information retrieval, Data processing systems), (*Data processing systems, Information retrieval), Subject indexing, Libraries, Computers, Probability, Data storage systems, Automatic.

AD-606 258 Div. 32, 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON A ROUTING PROBLEM,
by Richard Bellman. 20 Dec 56, 8p P-1000
Unclassified report

Descriptors: (*Urban planning, Transportation), (*Dynamic programming, Urban planning), Equations, Iterative methods, Time, Urban areas, Mathematical models.

Given a set of N cities, with every two linked by a road, and the times required to traverse these roads, we wish to determine the path from one given city to another given city which minimizes the travel time. The times are not directly proportional to the distances due to varying quality of roads, and varying quantities of traffic. The functional equation technique of dynamic programming, combined with approximation in policy space, yield an iterative algorithm which converges after at most (N-1) iterations. (Author)

AD-606 305 Div. 32, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A PSYCHOANALYTIC INTERPRETATION OF WOODROW WILSON: A BOOK REVIEW,
by B. Brodie. 1 Apr 57, 19p P-1096
Unclassified report

Descriptors: (*Leadership, History), (*Reviews, History), (*History, Reviews), Personality, Psychology, Behavior, Political science, United States Government.

An account of the strange relationship between the two figures mentioned in the title, and of their part in history, is presented in the volume reviewed. The authors have attempted a psychoanalytic study of the personality structure of Woodrow Wilson.

AD-606 355 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET TRADE AND AID: TRICKLE OR TORRENT,
by Hans Heymann, Jr. 14 Feb 57, 18p P-1047
Unclassified report

Descriptors: (*Foreign aid, USSR), (*Commerce, USSR), (*USSR, Foreign aid), Foreign policy, Economics, Distribution (Economics), Government (Foreign).

The problems of economic growth in the Soviet bloc and the non-communist world, particularly as they may affect the economic competition between the two, are discussed. The relationship between the growth of the Soviet economy and its participation in foreign trade and technical assistance is examined, and an appraisal is given of the likely impact of the Soviet 'economic offensive'.

AD-606 356 Div. 32, 23, 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOVIET LABOR AND THE QUESTION OF PRODUCTIVITY,
by Jerzy G. Gliksman. 29 Mar 57, 17p P-1048
Unclassified report

Prepared for presentation at the conference of the Industrial Relations Research Association, Washington, D. C., 19-20 Apr 57.

Descriptors: (*Symposia, Industrial relations), (*Industrial relations, USSR), (*Economics, USSR), Industrial production, Labor, Industrial psychology, Motivation, Wages, Personnel management, Social sciences.

The purpose of this paper is to discuss certain recent changes in Soviet labor policy which have been forced upon the Soviet leadership by the logic of this new order. The Soviet internal changes, as far as they go, do not tend to alter the basic tenets of Soviet rule; they are only an attempt to adjust these tenets to the requirements of a smoother and more efficient operation of the Soviet model of a modern industrial society. This is true of the reforms in the economic sphere, as well as the political. Of the economic reforms, recent changes in the field of industrial relations are geared primarily to the basic problem of any modern economy -- labor productivity.

AD-606 358 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE PSYCHOLOGICAL FACTOR IN SOVIET FOREIGN POLICY,
by Robert C. Tucker. 7 Mar 57, 37p P-1052
Unclassified report

Paper is slightly modified form of a lecture. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, USSR), (*USSR, Foreign policy), Political science, Government (Foreign), Communism, Propaganda, History, Eastern Europe, Cold war.

Stalin's death is considered as an implication for change in the motivation of Soviet foreign policy. The operative aim of the politics of cold war as practiced by Stalin after World War II was total control of foreign territory and people. The Stalinist picture of the world as cleanly divided between two antagonistic camps was a reflex of this drive for total control. One of its consequences was to exclude the notion of political neutrality or a 'third force' in world politics. Therefore, Stalin's death occasioned a psychological revolution in Soviet foreign policy. The driving concern with totality of control subsided, and there arose in the post-Stalin period a new expansionism of Soviet influence aimed at creating new spheres of influence rather than new satellites. The two-world image faded out, giving way to a picture in which two opposing systems of states compete for preponderance of influence in third states not belonging to either system.

32. Miscellaneous Arts and Sciences

AD-606 150 Div. 32
OTS Prices: HC $3.00/MF $0.75

Joint Publications Research Service, Washington, D. C.
RED FLAG, 1959, NO. 2, 16 JAN,
25 May 59, 92p JPRS(NY)-1629
TT 64 71442

Unclassified report

Trans. of Hung Ch'i (Chinese People's Republic) 1959, no. 2, 16 Jan, p. 1-41.

Descriptors: (*Periodicals, China), (*China, Periodicals), Communism, Economics, Commerce, Agriculture, Rural areas, Railroads, Construction, Transportation, Space flight, Recreation, Management control systems.

Articles from the Chinese Communist Theoretical Journal Hung Ch'i (Red Flag) are presented: How to view the improvement in the control system for rural finance and trade, unfold a large-scale mass movement for commune rectification, the way of our railroad construction, the entire party and people take part in transportation, space rocket, on the play, the agricultural production army of socialism, and diversified management in Ho-Chien Hsien.

AD-606 166 Div. 32
OTS Prices: HC $4.00/MF $1.00

System Development Corp., Santa Monica, Calif.
INDEX OF PUBLISHED PAPERS.
Scientific rept.,
by C. G. Lambert and M. J. Nicholson. 1 Aug 64,
134p SP-0/000/03

Unclassified report

Descriptors: (*Indexes, Reports), Bibliographies, Periodicals, Scientific research, Subject indexing.

AD-606 174 Div. 32
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE INFORMATION CENTER: SOME SELECTED EXAMPLES.
Scientific rept.,
by Emory H. Holmes. 4 Aug 64, 34p SP-1702

Unclassified report

Descriptors: (*Information retrieval, Libraries), (*Documentation, Data processing systems), Distribution, Reports, Automation, Design, Subject indexing, Data, Professional personnel.

The development of information centers, in contrast to traditional libraries, is discussed. Reasons for the failure of traditional libraries to meet special information needs of scientists, scholars, and technicians are pointed out. Information centers are discussed as a natural outgrowth of attempts to meet special information needs of scientists. Four selected operational information centers are discussed. Each center was selected to illustrate certain system design problems which should be considered when setting up an information center. (Author)

AD-606 181 Div. 32, 16, 26, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
SDC DOCUMENTS APPLICABLE TO STATE AND LOCAL GOVERNMENT PROBLEMS.
Scientific rept.,
comp. by Herbert H. Isaacs. 11 Aug 64, 10p TM-2025

Unclassified report

Descriptors: (*Systems engineering, Bibliographies), (*Indexes, Operations research), (*Bibliographies, Systems engineering), (*Sociology, Systems engineering), Documentation, United States government, Medical research, Programming (Computers), Education, Training, Urban planning, Simulation, Information retrieval, Law, Computers, Management engineering.

This document contains a selective list of SDC publications available to external requesters. The documents on this list were selected on the basis of their general or specific applicability to current problems of state and local government. Work of a more basic research nature has been omitted. The list is organized by substantive categories and alphabetically by author within each category. The categories include: The administration of justice, bio-medical systems, computer program systems, the development and management of computer-based systems, education and training, information retrieval, simulation in experimentation, and urban information systems.

AD-606 192 Div. 32, 30
OTS Prices: HC $5.00/MF $1.00

Air Force Materials Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
AN EVALUATION OF LINKS AND ROLES USED IN INFORMATION RETRIEVAL.
Master's thesis,
by Jefferson D. Sinnett. Jul 64, 154p
Proj. 7381, Task 738103
ML TDR64 152

Unclassified report

Prepared in cooperation with Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

Descriptors: (*Information retrieval, Subject indexing), (*Subject indexing, Information retrieval), Digital computers, Indexes Operation, Documentation, Mathematical models, Statistical analysis, Errors, Data storage systems, Analysis, Theory, Selection, Separation.

The use of links and roles in an information retrieval system is evaluated. Links and roles are techniques for modifying a basic coordinate indexing method. The purpose of the modification is to reduce the amount of irrelevant information retrieved without losing relevant information. Theory of retrieval is reviewed, mathematical models are discussed, retrieval is described in terms of basic concepts for algebra of sets, and a method of scoring effectiveness is presented. Roles were found inferior to links. Links showed reduction of irrelevant information by over 56 percent while incurring less than five percent loss of relevant information. (Author)

AD-606 193 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BEHAVIOR OF THE FIRM SUBJECT TO EXTERNAL REGULATORY CONSTRAINT,
by Harvey Averch and Leland L. Johnson. Dec 61,
19p P-2488

Unclassified report

Prepared for presentation at the Econometric Society Meetings held in New York, December 28, 1961. A portion

feasibility and validity. There seem to be situations in the field that require simulation, and at least a useful scale of simulation seems to be feasible if the anthropologist is willing to learn certain skills, obtain certain help, and procure certain equipment--all within his means. The crudest form of the validity question, whether any laboratory study can obtain results at all comparable with those of field studies, has not been answered very well, but seems to be answered affirmatively. It remains for the anthropologist to question validity whenever he uses simulation, or any other method whatsoever.

AD-606 410 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INDUSTRIALIZATION AND ECONOMIC UNION IN GREATER EAST AFRICA,
by Benton F. Massell. Nov 62, 24p P-2643
Unclassified report

Presented to the Economics Club of Kenya, 1 Nov 62.

Descriptors: (*Symposia, Economics), (*Economics, Africa), (*Africa, Economics), (*Industries, Africa), Industrial production, Commerce, Distribution (Economics), Government (Foreign), Political science, Kenya, Tanganyika, Transportation, Costs.

Economic decisions facing East African policy-makers can be viewed in terms of three alternatives: (1) Economic separation; (2) Continuation of the existing East African Common market, possibly with a more extensive coordination of economic activities among the three territories (Kenya, Tanganyika, and Uganda); and (3)Extension of the common market to include some of the neighboring countries.

AD-606 416 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMETRIC VARIATIONS ON A THEME BY SCHNEIDER,
by Benton F. Massell. May 62, 12p P-2582
Unclassified report

Descriptors: (*Agriculture, Tanganyika), (*Economics, Agriculture), (*Statistical analysis, Economics), Production, Statistical functions, Statistical processes, Subsaharan Africa.

In a recent paper, Harold K. Schneider provides an interesting and provocative analysis of the economic activities of the Turu, an aboriginal tribe in the central part of Tanganyika. He provides evidence that the Turu are, to a large extent, motivated by economic considerations, notably, maximization of profit and accumulation of wealth. While he stops short of a quantitative analysis of the Turu economy, Professor Schneider does provide some excellent data relating to agricultural production, the principal Turu occupation. The present paper presents an analysis of these data, using elementary econometric techniques. Thus Schneider's qualitative observations on the relationship among the variables are supplemented by a more formal treatment that involves fitting a production function to cross-section data, using multiple regression analysis. (Author)

AD-606 450 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
INTELLECTUAL UNREST BEHIND THE IRON CURTAIN,
by Paul Kecskemeti. 11 Jul 57, 21p P-1127
Unclassified report

Descriptors: (*Political science, USSR), (*USSR, Political science), Communism, Government (Foreign), Communists, Leadership, Public opinion, Hungary, Poland.

There is ferment among the intellectuals behind the Iron Curtain. It manifested itself most dramatically in Poland and Hungary where a full-fledged literature of rebellion emerged last year, but in Soviet Russia, too, the symptoms of nonconformism among the literati are unmistakeable. The political background and significance of this phenomenon are discussed.

AD-606 454 Div. 32
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
KHRUSHCHEV AND THE POLITICAL CRISIS OF JUNE, 1957,
by Myron Rush. 23 Jul 57, 55p P-1135
Unclassified report

Paper is based on an article by the same author entitled 'Khrushchev and the Stalin Succession' and pub. as RM 1883, 20 Mar 57.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Political science, USSR), (*USSR, Political science), Communism, Government (Foreign), Communists, Leadership, History, Military personnel.

The Communist party apparatus -- the men engaged in administering party affairs and in imposing its will upon the other institutions of Soviet society -- has been strengthened by each of Khrushchev's victories since mid-1953. In the June days, when Khrushchev achieved his greatest triumph, the party apparatus acquired an authority in Soviet society which it had not possessed for perhaps a quarter of a century. Representatives of the party apparatus, sixteen of its most powerful secretaries, were elected to two-thirds of all the places on the Khrushchev-dominated Presidium, although in Stalin's time they had not occupied more than half the Politburo seats. It seems clear that the plot of the 'anti-party group' was conceived in desperation to protect the remnants of their power against the incipient dictator, although the dimensions of their plot, and its details, remain obscure.

AD-606 461 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
KHRUSHCHEV AS SENIOR SECRETARY: HIS RISE AND HIS AMBITIONS,
by Myron Rush. 16 Aug 57, 14p P-1146
Unclassified report

Descriptors: (*Political science, USSR), (*USSR, Political science), (*Communism, Leadership), Government (Foreign), History.

Evidence is presented to show that Khrushchev not only sought to magnify his authority as senior secretary, but even tried to establish himself as Stalin's rightful successor. His goal was to achieve powers like those of Stalin in 1930. In this light, the results of the 'June days' were nothing adventitious, but an end brought about by the designs of Khrushchev.

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-606 359 Div. 32, 26, 28
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE PROSPECTS OF A UNIFIED THEORY OF ORGANIZATIONS,
by Olaf Helmer. 3 Apr 57, 12p P-1053
Unclassified report

Descriptors: (*Management engineering, Sociology), (*Systems engineering, Sociology), (*Sociology, Systems engineering), Game theory, Matrix algebra, Operations research, Theory, Decision making, Group dynamics, Standards, Management control systems.

Despite the success of numerous sporadic efforts in the study of organizations, there is at present no unified theory of organizations. This would require a clear-cut conceptual apparatus and a methodology for prediction. To achieve the former within the foreseeable future it might be wise to tie into the existing terminology of game theory; the latter may require taking a new look at the psychological problems involved and introducing something like an operations research approach to them. (Author)

AD-606 364 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
COMMENTS PREPARED FOR ANNUAL MEETING OF THE ASSOCIATION FOR ASIAN STUDIES, PANEL DISCUSSION OF ECONOMIC DEVELOPMENT IN SOUTH ASIA, SHERATON-PLAZA, BOSTON, APRIL 3, 1957,
by Charles Wolf, Jr. 15 Apr 57, 14p P-1061-RC
Unclassified report

Descriptors: (*Symposia, South Asia), (*South Asia, Economics), (*Economics, South Asia), India, Indonesia, Philippines, Rural areas, Urban areas, Government (Foreign), Leadership, Population, Labor, Social sciences, Political science.

The political and economic factors involving the growth and development of South Asia are discussed. India's Second Five Year Plan, and government leadership in the Philippines and Indonesia are also considered.

AD-606 377 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC PROBLEMS OF ALLIANCE,
by Malcolm W. Hoag. 8 May 57, 39p P-1080-RC
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, Economics), (*Armed forces operations, Economics), (*Economics, Armed forces operations), Costs, Labor, Defense systems, Game theory, Decision making, Commerce, Cold war, Armed forces (Foreign), United States government.

After discussing the customary view taken of alliance economics and its drawbacks the argument considers alternative views. Narrow tests of economic efficiency in military allocations are seen to be sharply restricted in applicability, while a broad formulation in terms of game theory avoids these restrictions at the overriding cost of unworkability. Yet some workable compromise must be evolved to handle urgent practical problems, and one way is suggested by the traditional treatment of civilian trade problems. The outstanding issues confronting any such treatment of burden-sharing problems and the choice of military means are then sketched.

AD-606 382 Div. 32, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SPACE LAW BIBLIOGRAPHY,
by John C. Hogan. 15 May 57, 13p P-1087
Unclassified report

Descriptors: (*Space flight, Law), (*Law, Upper atmosphere), (*Upper atmosphere, Law), (*Bibliographies, Law), Social sciences, Indexes.

Only since the end of World War II has there been a serious interest in the problems of law and activities in the upper atmosphere. Scholarly articles on this subject have been published recently by lawyers in Canada, England, France, Germany, and the USSR, and there are materials in the American law reviews which apply--either directly or by analogy--to man's activities above the surface of the earth. The immediate problem is State sovereignty in the upper atmosphere. Some attention has also been given to the long-range problem of a system of jurisprudence for activities in space.

AD-606 383 Div. 32, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LEGAL TERMINOLOGY FOR THE UPPER REGIONS OF THE ATMOSPHERE AND FOR THE SPACE BEYOND THE ATMOSPHERE,
by John C. Hogan. 15 May 57, 27p P-1088
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space flight, Law), (*Law, Upper atmosphere), (*Upper atmosphere, Law), Atmosphere, Stratosphere, Exosphere, Troposphere, Ionosphere, Vocabulary.

There are no established definitions in law for describing the upper regions of the atmosphere. The urgency of the need for a standard terminology in law for describing these regions and the areas beyond arises from the fact that there is a variety of man-made objects which will soon be operating at high altitudes--some outside the atmosphere--and these can be expected to present somewhat different legal problems depending upon the heights and speeds at which they fly. Astronautical jurisprudence is a new field of law, and it raises some basic questions which must soon be answered, namely: What, in law, is meant by the term 'airspace'. What are the scientific divisions of the upper regions of the earth's atmosphere. How does 'space' differ from 'outer space', 'world space', 'territorial space', 'contiguous space', 'terrestrial space', etc.

AD-606 409 Div. 32, 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SIMULATION: AN INTRODUCTION FOR ANTHROPOLOGISTS,
by David G. Hays. Nov 62, 33p P-2668
Unclassified report

Descriptors: (*Anthropology, Simulation), (*Sociometrics, Simulation), Psychometrics, Behavior, Conditioned reflex, Mathematical models, Group dynamics, Culture, Motivation, Performance (Human), Decision making, Game theory, Air defense command, Operations research, Social sciences.

Anthropologists will not use simulation when other techniques are adequate, but when simulation is the only possible technique available two questions remain: technological

AD-606 579 Div. 32
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE MINOR ASIAN COMMUNIST STATES: OUTER MONGOLIA, NORTH KOREA, NORTH VIETNAM,
by Paul F. Langer. Sep 64, 54p P-2981
Unclassified report

Descriptors: (*Communism Asia), (*Asia, Communism), Outer Mongolia, North Korea, Vietnam, History, Foreign policy, Leadership, Economics, Military strategy, Limited war, Cold war Government (Foreign), Political science, USSR, China.

A discussion on three Asian Communistic states -- Outer Mongolia, North Korea, and North Vietnam--is presented. The three states, all in territory that belongs traditionally to the Chinese sphere of influence, have reacted quite differently to the Sino-Soviet conflict. An analysis of each nation's reaction is presented.

AD-606 582 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
TOWARD A GENERAL THEORY OF CUSTOMS UNIONS FOR DEVELOPING COUNTRIES,
by C. A. Cooper and B. F. Massell. Sep 64, 22p P2919-1
Unclassified report

Descriptors: (*Economics, Theory), Government (Foreign), Commerce, Industries, Industrial production, Costs.

An attempt is made to lay a corner-stone for a general theory of customs unions in less-developed countries. No attempt is made to examine the conditions under which a protectionist policy makes good sense; rather industrialization is accepted as a legitimate policy goal, and membership in a customs union is considered as a means toward a desirable economic end.

AD-606 586 Div. 32, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FEDERAL SPENDING FOR NATIONAL SECURITY,
by David Novick. 10 Oct 57, 17p P-1197
Unclassified report

Presented to the Subcommittee on Fiscal Policy, Joint Economic Committee, Congress of the United States, 21 Nov 57. This paper was completed in Aug 57 and submitted prior to the launching of a satellite by the USSR.

Descriptors: (*Economics, United States), (*Defense systems, Costs), (*National defense, Costs), United States government, Government procurement, Arms control, Disarmament; Nuclear weapons, Armed forces budgets, Department of Defense.

Seven factors which can be expected to influence current and future trends in Federal spending for national security purposes are listed and discussed. The list is illustrative rather than exhaustive, but it is sufficiently complete to show that the level of expenditures is determined by a wide variety of causal factors.

AD-606 594 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
PAIRS OF RUSSIAN WORDS WITH HIGH CORRELATION,
by David G. Hays. 15 Nov 57, 70p P-1218
Unclassified report

Descriptors: (*Language, USSR), Word association, Correlation techniques, Dictionaries, Training devices. Education.

A list of 2731 pairs of Russian words is given; the words in each pair are correlated at the 0.01 level of significance. These pairs were selected upon analysis of the occurrences of 200 words in 4037 pages of general text. (Author)

AD-606 598 Div. 32, 33
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE HUMAN SIDE OF THE BERLIN AIRLIFT,
by W. Phillips Davison. 3 Dec 57, 28p P-1224
Unclassified report

Descriptors: (*Berlin, Air transportation), (*Air force personnel, Berlin), Social sciences, Social psychology, Emotions, Stress (Physiology), Stress (Psychology), Motivation, Public relations, Food dispensing, Armed forces (Foreign), Political science.

Considerable attention has been given the technical lessons learned from the Berlin airlift, especially in regard to aircraft and air space utilization, training procedures, cargo handling, and so on. Less attention has been given the human factors involved in the airlift's operations, although these were certainly no less important to its success or failure than were the material and organizations aspects. This paper is devoted to a discussion of some of these human factors.

AD-606 599 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
SECULAR TRENDS IN THE BIRTH RATIO OF WHITES, BY STATES FOR THE UNITED STATES, 1870-1950,
by Bernard Okun. 3 Dec 57, 80p P-1225
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Population, United States), (*United States, Birth), (*Birth, United States), Children, Males, Females, Infants, Aging (Physiology), Economics, Sociology, Urban areas, Statistical data, Tables.

Consisting of census figures on the distribution of population in the United States by age and sex, the data are reported by states and cover the time span from 1870 to 1950. The age distribution data distinguish five-year intervals, and are recorded separately for native whites and foreign-born whites. In the analysis, there are 46 spatial units. These include each of the 48 states, except Oklahoma for which there are no data prior to 1890 and except for the treatment of North and South Dakota as one unit called Dakota.

AD-606 614 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION 2: RESEARCH METHODOLOGY,

AD-606 523 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EFFECT OF SAVINGS AND FOREIGN AID ON NATIONAL GROWTH RATES,
by R. E. Johnson. Aug 64, 44p RM-4042-AID
Unclassified report

Descriptors: (*Foreign aid, Economics), (*Economics, Foreign aid), Government (Foreign), United States government, Money, Statistical analysis, Mathematical models, Least squares method, Equations, Tables.

The effect of our foreign aid program on the economic growth rates of recipient nations is a subject of controversy. Moreover, it is not clear which of the possible techniques of analysis, if any, will help resolve the issue. The main aim of this study is to shed some light on the subject through the use of a macro-analytic technique. Various factors that affect growth rates are analyzed in order to estimate the contribution of foreign aid to economic growth, and to provide a method for identifying those countries that seem most likely to benefit from aid.

AD-606 524 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DO DISPARITIES BETWEEN REAL AND MONEY PRICES MODIFY TRADITIONAL ARGUMENTS FOR FREER TRADE.
by Stephen Enke. 15 Aug 57, 44p P-1154
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Foreign policy, United States), (*Economics, Commerce), (*Commerce, United States), Costs, United States government, Money, Labor, Labor unions, Bargaining, Wages, Safety, Industrial production, Public health, Warfare, Limited war; Cold war.

In the mid-20th century real costs are often not reflected by money costs, or real benefits by money gains. The main cause of these discrepancies is the intervention in price making of governments, large corporations, labor unions, etc. As a consequence, it is sometimes alleged that the economic efficiency that is supposed to flow from policies of freer trade cannot be relied upon in the world of today. However, it can be shown that, from the selfish viewpoint of a single country, the existence of discrepancies abroad between money and real costs and gains in no way modifies traditional arguments for free trade. Moreover, for a country like the United States, which has full employment, a strong current account, and a highly mobile labor force, it can be shown that import restrictions are usually not the answer when real values and money prices are disproportionate at home. (Author)

AD-606 532 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DOES EFFICIENT PEAK-LOAD PRICING INVOLVE DISCRIMINATION,
by Jack Hirshleifer. 9 Sep 57, 14p P-1169-RC
Unclassified report

Descriptors: (*Economics, Theory), Costs, Consumption, Commerce, Money.

It is contended that the efficient price differences in a peak-load situation shown in Steiner's analysis are not discriminatory because they are equal to the differences in the marginal cost of serving the classes of customers involved. By marginal cost is meant, ultimately, the marginal opportunity cost--the value set upon the resource by the customer in the most valuable alternative use being sacrificed.

AD-606 533 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ISRAEL'S NATIONAL EXPENDITURE: SUMMARY OF RESULTS,
by Harold Lubell. 9 Sep 57, 48p P-1170
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Economics, Israel), (*Israel, Economics), Government (Foreign), Population, Consumption, Costs, Distribution (Economics), Money, Commerce, Agriculture, Industrial production, Statistical data, Labor, Government procurement, Armed forces procurement.

The gross national product estimates in this report are examined from two points of view: as an indicator of national welfare, by determining levels of output at any given time and, more important, evaluating changes in output over time; and as a means of measuring the allocation of national resources. Both these aspects are of interest for Israel in its efforts to deal with its threefold problem of maintaining an adequate standard of living for a population which is rapidly increasing through immigration, meeting an acute external security threat, and reducing (or, hopefully, eliminating) dependence on foreign economic aid by increasing domestic output.

AD-606 540 Div. 32
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
'CONTRADICTIONS' IN THE MOSCOW-PEKING AXIS,
by Allen S. Whiting. 24 Sep 57, 62p P-1183
Unclassified report

This paper is part of a symposium on relations between the Soviet Union and its bloc affiliates, appearing in the Journal of Politics, Feb 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Communism), (*Communism, Leadership), (*China, Foreign policy), (*USSR, Foreign policy), Armed forces operations, Government (Foreign), Limited war, Political science, Economics, Foreign aid, Industrial production, Agriculture, Consumption, Commerce, Propaganda, Cold war, Public opinion.

Two possibly interrelated events unleashed new forces to work upon the Sino-Soviet alliance. The death of Stalin in March 1953 signalled an end to the undisputed dominance of world communism by a single leader. The Korean armistice four months later freed Communist China from a burdensome military commitment. The combined impact of these two events upon the Moscow-Peking axis became increasingly evident with each successive year. However not until 1956-1957 did the divisive as well as the cohesive forces operating within the alliance make clear the trend of changing relationships between Moscow and Peking, a trend which is of critical policy relevance both to the partners and to their opponents outside the Soviet bloc.

AD-606 659 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
HOW CITIES SHOULD APPROACH DATA PROCESSING,
by Raymond J. Mason. Jul 62, 10p P-2610
Unclassified report

Descriptors: (*Urban areas, Data processing systems), Social sciences, Data storage systems, Input-output devices, Urban planning, Costs, Communication systems, Population.

Although certain benefits can be achieved through clerical mechanization alone, the most important benefits to cities will come through the application of the new data processing equipment to entirely new ways of handling information. In order to achieve these benefits, cities must understand both the nature of data systems and the equipment available for improving them. All data systems consist of five basic activities--whether they are automatic, semi-automatic, or merely manual systems. These activities are input, storage, processing, output, and communications. The ideal system toward which cities should work is one in which environmental type data gathered by all departments is filed in unified, central records describing persons or parcels of real property. These central files would replace many existing files--not be created in addition to them--since they would be available to all departments for functional use in their normal operations. Eventually, these central files should be based on even larger areas, covering more than one city--such as county, metropolitan area, or an entire state.

AD-606 683 Div. 32, 15
OTS Prices: HC $0.00/MF $0.50

Cowles Foundation for Research in Economics, Yale Univ., New Haven, Conn.
AN EXPERIMENTAL STUDY IN OLIGOPOLY.
Discussion paper,
by James W. Friedman. 23 Sep 64, 42p Cowles-DP-174
Contract Nonr3055 00
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Economics, Mathematical models), Commerce, Money, Equations, Behavior, Industries, Statistical processes, Probability, Matrix algebra, Decision making.

A very general model with which many theories of oligopolistic behavior might be tested would be a useful tool for economists. In the first part of this paper a model is proposed for this role. The model is not developed in the fullest degree of generality, but is presented in the way most relevant to experiments of the type presented in the second part of the paper. The experiments employ a simple market model in which each subject takes the role of a business firm, each firm has only one decision variable under its control (its own price) and the number of firms in an industry is two, three and four. (Author)

AD-606 689 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE JAPANESE COMMUNISTS AND THEIR STRUGGLE FOR POWER,
by Paul F.Langer. Mar 62, 42p P-2571
Unclassified report

This paper is a very rough draft of a talk to be given at the Annual Meeting of the Association for Asian Studies in Boston, Mass. (14th) 2-4 Apr 62. It is part of a symposium on 'Communism in Asia, The Struggle for Power.

Descriptors: (*Symposia, Asia), (*Japan, Communism), (*Communism, Japan), History, Leadership, Government (Foreign), Communists, Power, Political science.

AD-606 699 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMICS OF DEFENSE,
by Roland N. McKean. Jul 64, 30p P-2926
Unclassified report

Prepared for publication in International Encyclopedia of the Social Sciences.

Descriptors: (*Economics, Defense systems), (*Defense systems, Economics), Costs, Budgets, Money, United States government, Decision making, Operations research.

AD-606 834 Div. 32, 28
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison.
STUDY OF THE INFLUENCE OF CERTAIN CULTURAL AND CONTENT VARIABLES ON THE EFFECTIVENESS OF PERSUASIVE COMMUNICATIONS IN THE INTERNATIONAL FIELD.
Annual rept. no. 1, 1 Feb-1 Oct 64,
by S. Watson Dunn, E. S. Lorimor, and Robert E. Hopkins. Oct 64, 12p
Contract Nonr1202 24, Proj. NR177 287
Unclassified report

Descriptors: (*Social communication, Culture), (*Culture, Social communication), (*Social psychology, Social communication), Industries, Government (Foreign), Public opinion, Language, Periodicals, Emotions, Attitudes, Personality, Commerce, Social sciences, Sociometrics.

The report deals with the influence of certain cultural and content variables on the effectiveness of persuasive communications in the international field. The major part of the researchers' efforts was spent in reviewing the literature, consulting experts in the field of international communication, conceptualizing the problems, constructing interview schedules, formulating a research design, and pre-testing materials.

AD-606 841 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
LINGUISTIC ANALYSIS IN MACHINE TRANSLATION RESEARCH,
by H. P. Edmundson. 4 Apr 58, 12p P-1328
Unclassified report

Paper read at 'A Symposium on Documentation or a Study of Information Retrieval Systems', School of Library Science, University of Southern California, 9-11 Apr 58.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Language), (*Language, Analysis), Information retrieval, Programming (Computers), Programming languages, Mathematics, Physics.

by H. P. Edmundson and D. G. Hays. 16 Dec 57, 26p
P-1251

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Language), USSR, Digital computers, Programming (Computers), Punched cards, Input-output devices, Data processing systems, Dictionaries, Automatic.

This paper introduces a series that describes the methods now in use for research on machine translation of scientific Russian. The purpose of this series is to clarify the technical problems of computer application in linguistic research, to stimulate research in machine translation, and to encourage standardization of working materials. The general approach being followed and its philosophy and method are described. The method is conveniently divided into four components: text preparation, glossary development, translation, and analysis.

AD-606 616 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE LIMITS AND PROBLEMS OF 'DECOMPRESSION': THE CASE OF HUNGARY,
by Paul Kecskemeti. 13 Jan 58, 30p P-1253

Unclassified report

Prepared for publication in Annals of the American Academy of Political and Social Science, May 58. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hungary, Political science), (*Communism, Hungary), Social sciences, Government (Foreign), History, Economics, Leadership, USSR.

Revolt in Hungary might well have been forestalled by a consistent evolutionary policy or, failing this, by a recrudescence of terror. Moscow, however, chose to steer a middle course between these alternatives. It had an illusory faith in the unlimited efficacy of manipulation from above and underestimated the moral factor. The Hungarian developments have demonstrated the fallibility of Moscow's concept of manipulative decompression.

AD-606 618 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FACTORS ASSOCIATED WITH INCOME VARIABILITY,
by Ralph B. Bristol, Jr. 29 Dec 57, 22p P-1255

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wages, Statistical data), Economics, United States, Population, Distribution (Economics), Aging (Physiology), Education, Money, Tables, Urban areas.

Two recent theories of consumer saving have been based on the assertion that a family's income in a given year, as reported in a cross-section survey, is not the relevant income for explaining its saving behavior. Rather, its income over some longer period of time should be considered. Inasmuch as surveys relying on respondents' recall of income changes from previous years appear to be greatly affected by memory errors, some type of reinterview procedure is necessary. Such a reinterview study was carried out by the Survey Research Center over the years 1954-56, under a grant from the Ford Foundation. A representative cross section of the urban population of the United States was interviewed in June of 1954, and reinterviewed in December of 1954, June of 1955, December of 1955, and March of 1957.

AD-606 621 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE IMAGE OF DUAL RUSSIA,
by Robert C. Tucker. 30 Jan 58, 44p P-1265

Unclassified report

Prepared for presentation to the Conference on the Transformation of Russian Society since 1861, held 25-27 Apr 58. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*USSR, History), (*Political science, USSR), Sociology, Population, Public opinion, Leadership, Governfment (Foreign), Culture, Communism.

According to some pre-revolutionary sources, Russians began to talk of a 'thaw' at the close of the reign of Iron Tsar Nicholas I, who died in 1855. The thaw was manifested in a change of atmosphere, a relaxation of censorship, and other signs of softening of the bureaucratic regimentation of society which marked Nicholas' long reign. The image of the thaw projected the period lived through as a gray interminable Russian winter of despotism above and paralysis of society below. The incipient relaxation of state controls was seen as the harbinger of a coming 'spring' of liberalization. The comparison with the official terror of the last years of Stalin's reign, and with the atmosphere in Russia as felt in the early months after his death in 1953, is very striking. No knowledge of obscure history books was needed in order for the word 'thaw' to come back into circulation. For Russia had just lived through another long gray winter of despotism above and paralysis of society below, and was now, once again, awakening to hope for change.

AD-606 639 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Defense Documentation Center, Alexandria, Va.
PHILOSOPHY AND GUIDELINES FOR REVISION OF THE THESAURUS OF ASTIA DESCRIPTORS,
by T. L. Gillum, P. H. Klingbiel, C. N. Mooers, and E. Wall. 1 Nov 61, rev. Oct 64, 24p

Unclassified report

Descriptors: (*Information retrieval, Vocabulary), (*Department of Defense, Information retrieval), Bibliographies, Documentation.

In response to many inquiries from users of the Thesaurus of ASTIA Descriptors and from others interested in the use of controlled vocabularies for mechanized information retrieval, this paper is offered as an outline of the general plan to be followed in the preparation of a Second Edition of the ASTIA Thesaurus. The philosophies of the descriptor and thesaurus approaches to information retrieval are discussed, with particular emphasis on the relationships among descriptors. Although this document was intended as a guide line for individuals who had been invited to participate in the preparation of the Second Edition, the discussion of the thesaurus philosophy is believed to be of general interest to documentalists. Included is a bibliography which cites papers dealing with the general concept of technical vocabularies.(Author)

33. Transportation

AD-606 376 Div. 33, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONSTRUCTION OF MAXIMAL DYNAMIC FLOWS IN NETWORKS,
by L. R. Ford, Jr. and D. R. Fulkerson. 7 May 57, 13p P-1079

Unclassified report

Descriptors: (*Transportation, Mathematical programming), (*Mathematical programming, Transportation), Traffic, Optimization, Numerical methods and procedures.

This note describes briefly an algorithm for solving the following problem. Suppose given a network (linear graph) in which each link has associated with it two positive integers, one a commodity flow capacity, the other a traversal time. Assuming that some node of the network is a source for the commodity, another a sink, and the remaining may either transship the commodity immediately on receipt or hold for later shipment, what is the maximal amount that can be shipped from source to sink in any given number of time periods. No proofs are given.

AD-606 396 Div. 33
OTS Prices: HC $5.00/MF $1.25

David Taylor Model Basin, Washington, D. C.
THE HANDLING OF SHIPS THROUGH A WIDENED AND ASYMMETRICALLY DEEPENED SECTION OF GAILLARD CUT IN THE PANAMA CANAL,
by Charles G. Moody. Aug 64, 196p
DTMB 1705

Unclassified report

Prepared in cooperation with the Panama Canal Co. and the U. S. Navy Hydrographic Office.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Inland waterways, Geometric forms), (*Ships, Maneuverability), Traffic, Handling, Hydrodynamics, Stability, Cargo ships, Model tests, Panama.

The results of a series of model tests on the handling of deeply laden ships in a widened and asymmetrically deepened section of Gaillard Cut in the Panama Canal are presented. These data show that widening and deepening the channel greatly reduce the interaction forces over the greater part of the channel width, and that this effect is accompanied in the case of very large ships by a marked improvement in directional stability. It is concluded from the investigation that the asymmetrical shape of the channel and the abrupt change in depth between the old cut on one side and the new cut on the other do not have any untoward effect on the performance of the ships. (Author)

AD-606 544 Div. 33, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A FEASIBILITY CRITERION FOR STAIRCASE TRANSPORTATION PROBLEMS AND AN APPLICATION TO A SCHEDULING PROBLEM,
by D. R. Fulkerson. 2 Oct 57, 18p P-1188

Unclassified report

Descriptors: (*Transportation, Scheduling), (*Scheduling, Transportation), Feasibility studies, Cargo vehicles, Optimization, Set theory, Integrals, Inequalities, Functions.

A feasibility criterion for transportation problems in which certain variables are inadmissible is shown to yeild a simple feasibility test for such problems when the admissible set has the form of a staircase. A simple rule is then presented for singling out a feasible solution for staircase problems. As an application of these results, it is shown that a particular case of the problem of minimizing the number of carriers to meet a fixed schedule can be solved explicitly by an appropriate interpretation of the staircase rule. (Author)

AD-606 853 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET EMPLOYMENT OF MILITARY STRENGTH FOR POLITICAL PURPOSES,
by Herbert S. Dinerstein. 10 Apr 58, 24p P-1317
Unclassified report

Prepared for publication in The Annals of the American Academy of Political and Social Science, Jul 58.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Political science, USSR), (*USSR, Political science), Communism, Foreign policy, Government (Foreign), Armed forces operations, Armed forces (Foreign), History, Limited war, Cold war, Leadership.

This paper seeks to demonstrate that changes in the nature of war and in the political organization of the world make it much more difficult for the Soviet Union to expand politically and territorially than did Germany and Japan when they made, and then partially enforced, their claim to a place in the sun. The doctrinaire Marxist belief that Communism must wax as capitalism wanes reinforces the caution and conservatism dictated by military and political considerations.

AD-606 854 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AUTOMATIC COMPUTERS IN MACHINE-TRANSLATION RESEARCH,
by D. G. Hays. 4 Apr 58, 12p P-1321
Unclassified report

Paper read at 'A Symposium on Documentation or a Study of Information Retrieval Systems', School of Library Science, University of Southern California, 9-11 Apr 58.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Machine translation, Digital computers), (*Language, Machine translation), Computer logic, Programming (Computers), Analysis, Information retrieval, Physics, Mathematics.

AD-606 863 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE RUSSIAN URBAN WORKER: FROM SERF TO PROLETARIAN,
by Jerzy G. Gliksman. 7 Apr 58, 30p P-1336
Unclassified report

This paper has been prepared for presentation to the 'Conference on the Transformation of Russian Society Since 1861,' held under the auspices of the Joint Committee of Slavic Studies at Arden House, Harriman, New York, 25-27 Apr 58.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Labor, USSR), (*USSR, Labor), Population, Industries, Rural areas, Urban areas, Wages, Communism.

The emancipation of the serfs in 1861 and the upheaval in industry and agriculture of 1928-1932 are undoubtedly the crucial milestones on the road to the formation of the Russian working class as we know it now. Emerging from serfs and peasantry, this class acquired the features of a modern urban proletariat in the continuous process of industrialization of the country.

AD-606 865 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE WRITER, THE EDITOR, THE PUBLISHER, AND THE READER,
by Brownlee Haydon. 10 Apr 58, 8p P-1339
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Documentation, Theory), Storage, Information retrieval, Abstracting, Reports, Articles, Libraries, Textbooks.

The discussion deals with documentation, storage, retrieval, abstracting, etc. For the sake of argument, the accompanying paper suggests that all these troubles could be ameliorated if scientists would resist the temptation to publish, and if referees, journal editors, and book publishers--not to mention readers--would use more discrimination.

AD-606 866 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC RESEARCH ON SOUTHEAST ASIA IN THE UNITED STATES: STATUS AND NEEDS,
by Charles Wolf, Jr. 16 Apr 58, 8p P-1340-RC
Unclassified report

Delivered at panel discussion of Southeast Asian Research Annual Meeting of the Association for Asian Studies, New York, 2 Apr 58.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Economics, South Asia), (*South Asia, Economics), Social sciences, Statistical data, Population, Wages, Money, Agriculture, Rural areas.

The author contends that most economic research on Southeast Asia in the United States is and has been descriptive, and, in a loose sense, evaluative. Second, concerning needs, Southeast Asian economic research ought to be more scientific, or rigorously theoretical than it has generally been.

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606 701	2
606 702	8
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606 833	1
606 834	32
606 835	31
606 836	14
606 837	25
606 838	8
606 839	8
606 840	2
606 841	32
606 842	15
606 843	15
606 844	15
606 845	28
606 846	24
606 847	18
606 848	25
606 849	15
606 850	1
606 851	15
606 852	15
606 853	32
606 854	32
606 855	8
606 856	18
606 857	12

It is shown that the equations can also be solved without making this simplification, and that the character of the resulting eigenvalue problem is markedly altered by this. Computations made with this more exact model indicate that previously obtained results are in doubt. (Author)

PB-166 080 Div. 2
OTS Prices: HC $3.00/MF $0.75

Geophysical and Polar Research Center, Univ. of Wisconsin, Madison.
MICROSCOPIC EXTRATERRESTRIAL PARTICLES FROM THE ANTARCTIC PENINSULA TRAVERSE.
Research rept. series,
by Richard A. Schmidt. Jul 63, 102p GPRC-RR-63-3

Unclassified report

Descriptors: (*Polar regions, Meteorites), (*Meteorites, Microstructure), Minerals, Collecting methods, Petrography, Geology.

Microscopic extraterrestrial particles were recovered from meltwater of snow core samples. While several types of particles were recognized, black, metallic spherules and yellowish glassy spherules were most common. The metallic spherules ranged from 10 to 170 microns in diameter, had physical properties similar to magnetite, and were ironrich. The surfaces of some metallic spherules were pitted, apparently from impact of smaller, nanometeorites. Others had ridged and furrowed surfaces which gave an intersecting, lamellar pattern. The glassy spherules ranged from 10 to 300 microns in diameter, had physical properties similar to lechatelierite or tektites, and were silica-rich. (Author)

PB-166 085 Div. 2
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
WINTER F-REGION ENHANCEMENTS AND IONIZATION DRIFTS IN THE ANTARCTIC.
Antarctic research and data analysis scientific rept. no. 8,
by T. Sato and G. F. Rourke. 25 Nov 63, 82p
RAD-TR-63-42
Grant NSF C255

Unclassified report

Descriptors: (*Ionosphere, Terrestrial magnetism), (*Terrestrial magnetism, Ionosphere), Atmosphere, Electrons, Drift, Ionization, Periodic variations, Magnetic fields, Electric fields, Geophysics.

Daily and seasonal variations of the monthly median F2-region critical frequency (foF2) in the Antarctic are examined. The abnormally large increase in foF2 is found most distinctive in winter in the areas around Ellsworth, South Pole, Byrd, Little America, Cape Hallett, and Terre Adelie. Statistically, the increase occurs between 0400 and 0900 universal time although individual days may differ. Synoptic maps of foF2 indicate the areas of abnormal large foF2 extend from the sunlit hemisphere across to the night hemisphere. Equivalent current systems of the magnetic variation coincide qualitatively with the foF2-distribution patterns. An explanation for this anomaly is given, taking into account the horizontal drift motion of electrons in the F2 region which is caused by the interaction of the electric field deduced from the magnetic Sq and Sd variation in the polar regions. Time variations of the foF2 worldwide distribution and of the F2-region behavior in the ionograms seem to support the drift theory. (Author)

PB-166 086 Div. 2
OTS Prices: HC $1.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MORPHOLOGY OF ABNORMAL ENHANCEMENTS OF F-LAYER IONIZATION IN POLAR REGIONS.
Antarctic research and data analysis scientific rept. no. 11,
by Geoffrey E. Hill. 10 Dec 63, 23p RAD-TR-63-48
Grant NSF C255

Unclassified report

Descriptors: (*Polar regions, Ionosphere), (*Ionosphere, Ionization), Atmospheric electricity, Terrestrial manetism, Electron density, Equations, Geophysics.

This report describes the morphology of sudden enhancements of F-layer ionization into polar-cap regions. These disturbances are shown to be caused by a horizontal movement of F-layer ionization driven by E-region electric currents. This problem was treated recently by Sato and Rourke (1963) and Hill (1963). This report contains a theoretical explanation of the results of their data analysis. Their analysis shows that F2-layer ionization may be carried across the polar caps by the action of electric and geomagnetic fields. The electric fields are set up by E-region electric currents and are then transferred to the F region along essentially vertical lines of geomagnetic force (Farley, 1959). The treatment of the problem presented here is simply the integration of the equation of continuity for electrons; this treatment uses a field of motion deduced from classical current systems such as those discussed by Fukushima (1953). (Author)

PB-166 095 Div. 2
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ANTARCTIC F2 REGION DISTURBANCES ASSOCIATED WITH GEOMAGNETIC STORMS.
Antarctic research and data analysis scientific rept. no. 13,
by Teruo Sato. 29 Apr 64, 36p RAD-TR-64-11
Grant NSF C255

Unclassified report

Descriptors: (*Ionospheric disturbances, Polar regions), (*Polar regions, Ionospheric disturbances), (*Magnetic storms, Polar regions), Ionosphere, Electron density, Drift, Solar radiation, Atmospheric electricity, Terrestrial magnetism, Geophysics.

Variations of the electron density in the Antarctic F2 region associated with individual geomagnetic storms are analyzed and the cause is studied. Analysis is done on the basis of winter data when the solar radiation responsible for the production of ionization is negligible. The results show that areas of enhancement and reduction (from the monthly median value) of the electron density are at least qualitatively related to the current system of the actual geomagnetic variation minus the Sd variation at the corresponding time. Therefore, the cause of the F2 region storm-time variations can be ascribed to changes in the direction and magnitude of horizontal electron drift during storms. They also contribute to the electron distribution on quiet days and are caused by the interaction between the geomagnetic field and electric field associated with the current system. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

1. Aircraft and Flight Equipment

PB-160 096 Div. 1, 28
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE PREDICTION OF A CRITERION OF FLIGHT SAFETY IN NAVAL AVIATION.
Research rept., vol. 13, p. 363-408,
by James F. Parker, Jr., and Ray C. Hackman.
1 Aug 55, 46p
Proj. NM001 056 08 01

Unclassified report

Descriptors: (*Aviation safety, Naval aviation), (*Pilots, Aviation accidents), (*Psychometrics, Pilots), Galvanic skin response, Attitudes, Statistical tests.

The study was designed to investigate differential accident liability among naval flight personnel. A number of studies in industry have indicated that in any given work group some individuals contribute disproportionately to the total number of accidents. This study evaluated one means of identifying such individuals in aviation. In addition, the following variables were investigated in terms of their relationship to a pilot's placement on continua of safeness and skill as a pilot: (1) attitudes toward various aspects of naval flying, (2) subjective evaluations of flight safety procedures and, (3) the galvanic skin response of a pilot recorded as he views statements concerning these same items of flight safety procedure. Measures of attitudes toward aspects of naval aviation; subjective evaluations of flight safety procedures; and measures of galvanic skin responses accompanying the viewing of items of flight safety procedure are demonstrated to be effective predictors of both the flight safety and skill criteria.

2. Astronomy, Geophysics and Geography

AD-282 778 Div. 2, 8, 25
OTS Prices: HC $1.00/MF $0.50

Owens Valley Radio Observatory, Calif. Inst. of Tech., Pasadena.
BRIGHTNESS DISTRIBUTION IN DISCRETE RADIO SOURCES. IV. A DISCUSSION OF 24 IDENTIFIED SOURCES,
by P. Maltby, T. A. Matthews, and A. T. Moffet.
1962, 24p
Contract Nonr220 19

Unclassified report

Observations of the California Inst. of Tech. Radio Observatory, 1962-4.

Descriptors: (*Extraterrestial radio waves, Brightness), (*Radio astronomy, Intensity), Stars, Luminescence, Galaxies, Doppler effect, Magnetic fields, Energy, Astronomical data, Optical properties, Astrophysics.

Radial distances, linear dimensions, and total luminosities are given for 24 identified extragalactic radio sources, 19 of which have measured radial velocities. Using the synchrotron theory, the total energy and magnetic field strength required to account for the observed luminosity are estimated for each source. Eight sources are found with energy requirements exceeding 10 to the 60th power erg. Typical field strengths are equivalent to .00001 oersted. The linear diameters range from less than 1 to 290 kpc. Illustrations of the radio and optical brightness distributions are given for 1 sources. (Author)

PB-160 212 Div. 2
OTS Prices: HC $7.00/MF $1.50

Naval Medical Research Inst., Bethesda, Md.
BRIGHTNESS OF THE ATMOSPHERE.
Research rept., vol. 11, p. 191-406,
by Norman L. Barr, James F. Murray, R. D. Murray, J. A. Hussman, Jr., and J. F. Parker. Mar 53, 336p
Projs. NM001 056 07 01, TED PTR AC223

Unclassified report

Descriptors: (*Atmosphere, Brightness), (*Sky brightness, Tables), Meteorological parameters, Optics, Photometers, Graphics.

This report presents data on atmospheric brightness and air temperature taken at nineteen selected altitudes from one to fifty thousand feet on clear days over water for altitudes of the sun ranging from 10 to 40 degrees. The tables give the measured brightness of the zenith, the nadir, and of points separated by 15 degrees of arc on circles at zenith angles 30, 70, 85, 110 and 150 degrees. Data on time, geographical position, weather conditions, pressure, air-temperature, altitude of observation, sun's azimuth and sun's altitude are included in the tables. Curves are included which show the relationship between measured atmospheric brightness and pressure, scattering angle and bearing. Curves based on the Hulbert theory are included for comparison purposes. (Author)

PB-166 079 Div. 2, 15
OTS Prices: HC $1.00/MF $0.50

Adelphi Univ., Garden City, N. Y.
ATMOSPHERIC TIDES,
by Michael Yanowitch. Jan 63, 38p AGM-106
Grant NSF G10322

Unclassified report

Descriptors: (*Atmospheric tides, Mathematic analysis), (*Microbarometric waves, Atmospheric tides), Atmospheric motion, Differential equations, Atmosphere, Mathematical models, Geophysics, Atmosphere models, Oscillation, Partial differential equations, Equation.

It has generally been assumed that in the equations for the atmospheric tidal problem it is permissible to replace r, the distance from the center of the earth to the particle, by a constant, alpha, the radius of the earth.

Explosions, Deception, Submarine noise, Noise.

This volume summarizes National Defense Research Committee (NDRC) participation in the sonar countermeasures program. The report covers the development of certain devices as well as the preliminary investigation of many more. It also reports the experience of these laboratories with special techniques of noisemaker calibration and in the evaluation and analysis of numerous tests of noisemaker preformance. Many of the Navy devices were measured by NDRC groups, and analyses of their performance have been included to give a more balanced picture of the field.

PB-166 232 Div. 6, 22
OTS Prices: HC $6.00/MF $1.25

Office of Scientific Research and Development. Div. 17.
DETECTION OF LAND MINES AND SOUND RANGING.
Summary technical rept., vol. 1,
ed. by Chas. E. Waring. 1946, declassified 2 Aug 60,
238p STR-17-1
Contract OEMsr1131
AD 221 602

Unclassified report

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Descriptors: (*Land mines, Detection), (*Mine detectors, Operation), (*Sound ranging, Ordnance locators), Mine clearance, Demolition, Magnetic mines, Underwater mines, Influence mines, Gas analysis, Infrared spectroscopy, Surgical equipment, Electromagnetic properties.

Contents: Detection of land mines; mechanical and demolition clearance of land mines; magnetic characteristics of vehicles and magnetic land mines; control system and detectors for submarine influence mines; gun ranging and locating systems; Infrared gas detectors and analyzers; detection of plastic particles; locating unexploded bombs; development of an electromagnetic mass detecting security device; surgeon's metal locator.

PB-166 252 Div. 6, 25
OTS Prices: HC $6.00/MF $1.25

Office of Scientific Research and Development. Div. 6.
UNDERWATER SOUND EQUIPMENT I. LISTENING SYSTEMS.
Summary technical rept., vol. 14,
ed. by John S. Coleman. 1946, declassified 2 Aug 60,
236p
Contract OEMsr1131
AD 221 591

Unclassified report

Descriptors: (*Underwater sound equipment, Antisubmarine warfare), (*Antisubmarine warfare, Underwater sound equipment), (*Sonar, Antisubmarine warfare), (*Hydrophones, Antisubmarine warfare), Acoustic detectors, Underwater sound, Sound transmission, Towed sonar, Buoys, Submarines, Position finding, Torpedoes, Underwater object locators, Harbor defense systems, Underwater communication systems.

Contents: Introduction to listening; evolution of listening gear; physical factors affecting the target signal; experimental listening systems; comparison of experimental systems; bearing indicator systems; surface craft listening equipment - JP systems; aircraft listening equipment - towed hydrophones; aircraft listening equipment - radio sono buoys; submarine listening equipment - JP and JT systems; the 692 sonar system; submarine triangulation-listening-ranging [TLR] system; torpedo detection studies and systems - MVP and TDM; harbor protection systems; submarine communication systems.

8. Electronics and Electronic Equipment

AD-269 571 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Lowell Technological Inst. Research Foundation, Mass.
EFFECTS OF EXTERNAL FORCES ON VIBRATING CYRSTAL PLATES.
Quarterly rept. no. 2, 1 Aug-31 Oct 61,
by Charles R. Mingins, Luther C. Barcus, and Robert W. Perry. 31 Oct 61, 41p
Contract DA36 039SC87198, Proj. 3G26 05 001

Unclassified report

Descriptors: (*Crystals, Stresses), (*Frequency shift, Crystals), Vibration, Compressive properties, Perturbation theory, Mathematical analysis, Functions, Quartz, Acceleration, Performance (Engineering), Reliability (Electronics).

Greater experimental precision is reported in the instrumentation for precise application of compressional stress across a diameter to a vibrating circular piezoid at each of a wide range of azimuthal angles, and for the measurement of deviations in frequency caused by such stresses. The smaller-period variations in frequency change have been eliminated by the use of larger d/h ratios and by changes in the experimental configuration. Further study of the effects obtained by applying the stress along planes other than the central plane is reported. The critical values of angle for frequency insensitivity are found to be independent of the magnitude of the force. Other conclusions are drawn. In the analytical treatment, additional corrections are made for the density and dimensions by perturbation methods. Results of the theory are fitted to experimental curves. (Author)

AD-295 658 Div. 8
OTS Prices: HC $3.00/MF $1.00

Spaceonics, Inc., Scarsdale, N. Y.
VALUE ENGINEERING STUDY OF MICROWAVE ANTENNAS.
Final rept.
by Herbert Hanft. Jan 63, 98p
Contract NOw62 0545c

Unclassified report

Descriptors: (*Antennas, Design), Spiral antennas, Slot antennas, Log periodic antennas, Microwaves, Bandwidth, Polarization, Electrical impedance, Waveguides, Equations, Propagation.

A value engineering study was made which focused attention to the potentialities of more recently developed Antennas. The techniques and methods described should assist in selecting and designing Microwave Antennas which are lighter and less expensive to develop and build then more conventional types. Two broad classes of Microwave Antennas are treated; (a) The flush mounted travelling wave antennas including the leaky-wave and surface wave types. (b) Frequency-Independent types for broadband application including, conical and planar equiangular spiral antennas, various log-periodic structures, and flared slot antennas. Several companies were visited to determine the major problem areas in the antennas and antenna systems presently specified. (Author)

AD-443 715 Div. 8, 15
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CHARACTERIZATION AND MEASUREMENT OF

PB-166 171 Div. 2
OTS Prices: HC $9.40/MF $2.75

Woods Hole Oceanographic Institution, Mass.
GRAVITY PROGRAM.
Final rept. for 1950-1959,
by G. P. Woollard and J. C. Rose. Jul 60, 636p
WHOI-Ref-60-26
Contract AF19 604 2157
AFCRL TR60 406; AD 250 567

Unclassified report

Descriptors: (*Gravity, Measurement), (*Geodesics, Gravity), Test facilities, Test equipment, Experimental data, Standardization.

The objective of the gravity program was to establish a series of reliable gravity control measurements through the use of pendulums over a sufficient range of gravity to permit the calibration of geodetic gravimeters with an accuracy of one part in 5000 over a range of 5000 mgals and thus assure a potential accuracy of 1 mgal or better with such gravimeters on any global series of measurements. The objective included the establishment of pendulum gravity measurements outside of North America as there appeared to be no unanimity of international opinion regarding a gravity standard. A second objective of the program was to expand the gravity coverage and standardize existing gravity surveys within the United States so that reliable gravity anomaly maps could be prepared. A third objective was to strengthen and expand the world network of airport gravity bases established earlier under the auspices of the Office of Naval Research so that data in all parts of the world could be integrated onto the same datum and gravity standard. (Author)

4. Chemistry

AD-408 974 Div. 4, 7
OTS Prices: HC $7.00/MF $1.75

Monsanto Research Corp., Everett, Mass.
INVESTIGATION OF ORGANIC FUELS FOR ELECTROCHEMICAL USE.
Rept. no. 1 (Final), 15 Jan-17 Oct 62,
by Ralph G. Gentile, John O. Smith, David L. Williams, and John S. Driscoll. 17 Oct 62, 360p
Contract DA36 039SC88945, Proj. OST760200471, ARPA Order247 61

Unclassified report

Descriptors: (*Electrochemistry, Fuel cells), (*Fuel cells, Organic compounds), (*Organic compounds, Oxidation), Electrolytes, Electrodes, Platinum, Carbon, Heat-resistant materials, Ionization potentials, Tables.

Anodic oxidation of 148 organic compounds, representing 55 families, was studied in basic, acidic, and neutral electrolytes at 30C and 90C and with Pt/C and Pt/Pt electrodes. The electrochemical characteristics and ease of oxidation were determined in half cells by galvanostatic methods. The results are presented in 2100 graphs of potential as a function of the log of current density, in tables listing the compounds in order of maximum current density and in tables listing the compounds in order of maximum power density (when coupled with a reversible oxygen electrode). The results are analyzed to show the types that are more easily oxidized, the similarities between families, and the effects of functional groups. The effect of high temperature (120-200C) was also investigated with certain selected compounds. A testing device was designed to scan the desired range of current density and to record the corresponding potential. (Author)

6. Detection

PB-166 170 Div. 6, 12, 30
OTS Prices: HC $3.00/MF $0.50

Army Missile Command, Redstone Arsenal, Ala.
OSCILLATIONS IN TRACKING DATA RESULTING FROM ROUNDOFF,
by L. Neel Beard and Roger A. MacGowan.
29 Jan 60, 52p
AMC-RA DC TR1 60; AD 233 290

Unclassified report

Descriptors: (*Guided missile tracking systems, Errors), (*Oscillations, Guided missile trajectories), (*Tracking, Data processing systems), Data, Mathematical analysis, Digital computers, Velocity, Acceleration.

Oscillations which exist in the numerical derivatives of tracking data, reduced from several different types of instrumentation, are studied. Several possible sources of the oscillations are eliminated. It is demonstrated that one possible source of oscillations may be numerical roundoff which exceeds the relative accuracy of the data. Some parameter studies are carried out to show the magnitude of this roundoff effect on typical trajectory accelerations. (Author)

PB-166 229 Div. 6, 1
OTS Prices: HC $5.00/MF $1.00

Office of Scientific Research and Development. Div. 6.
MAGNETIC AIRBORNE DETECTOR PROGRAM.
Summary technical rept., vol. 5.
1964, declassified 2 Aug 60, 164p STR-6-5

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction will be made from the best available copy.

Descriptors: (*Detectors, Antisubmarine warfare), (*Magnetometers, Airborne), (*Underwater object locators, Airborne), Detection, Submarines, Circuits, Magnetic fields, Signals, Automatic, Antisubmarine fire control systems, Training devices, Targets, Antisubmarine aircraft, Magnetic properties.

Contents: Saturated-core magnetometers, the AN/ASQ1 detection equipment, MAD signal studies, automatic firing systems, installations of MAD in aircraft, training devices and experimental equipment, and use of MAD for land targets.

PB-166 230 Div. 6, 18, 31
OTS Prices: HC $5.00/MF $1.00

Office of Scientific Research and Development. Div 6.
UNDERWATER SOUND EQUIPMENT VI: COUNTERMEASURES.
Summary technical rept., vol. 19,
Ed. by J. S. Coleman. 1964, declassified 2 Aug 60, 171p
STR-6-19
AD 221 608

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Underwater sound equipment, Countermeasures), (*Countermeasures, Underwater sound equipment), (*Sonar, Countermeasures), Acoustic decoys, Electronic countermeasures, Noise generators, Antisonar coatings, Undersea warefare, Underwater sound generators, Design, Batteries and components,

Work includes visual observation of the aurora. The SCR-270 radar was used to obtain echoes from several auroral disturbances. Photographs of typical echoes seen on the A-scope were obtained. Work on auroral propagation using amateur transmitters on 50 Mc/sec was continued and extended to 144 Mc/sec. The auroral fading rate on the higher frequency is about three times that on the lower frequency. The need for remote transmitters on these controlled frequencies has been reached and steps taken to provide them. Consideration is being given to special experiments designed to detect, at frequencies above the critical frequency, possible permanent back-scattering from ionospheric blobs associated with turbulence.

13. Installations and Construction

PB-166 137 Div. 13
OTS Prices: HC $5.00/MF $1.00

Louisiana State Univ., Baton Rouge, La.
PROCEEDINGS OF THE ANNUAL SHORT COURSE [NO. 26] FOR SUPERINTENDENTS AND OPERATORS OF WATER, SEWERAGE AND INDUSTRIAL WASTE DISPOSAL SYSTEMS, MARCH 13-15, 1963.
Div. of Engineering Research bulletin.
1964, 176p LSU-ERB-75

Unclassified report

Also available from Louisiana State Univ., $2.50.

Descriptors: (*Wastes (Sanitary engineering), Disposal), (*Wastes (Industrial), Disposal), Water, Sewerage, Sanitary engineering, Maintenance, Public health, Filters (Fluid), Structural engineering, Industries, Symposia.

Contents: planning for emergency management of resources; the Louisiana Municipal Association; taste and odor control methods; modern laboratory equipment techniques; basic plant arithmetic; water well construction; responsibility of water and sewerage works in tort in Louisiana and legal effect of franchises granted by police juries on growth of water and sewerage works; what is expected of water and sewerage utilities by bonding companies; progress report on the sewer maintenance program in the city of Lafayette; parallel water pump operation; basic hydraulics and water works operations; maintenance and operation of trickling filters; analysis of fish kills -- natural and man-made; waterworks operating reports--their preparation and use; rapid sand filtration; coagulation and sedimentation--principles and application; lime softening process; air blower maintenance; principles of operation and maintenance of clarification units; sewage treatment plant operating reports--their preparation and use; injection wells--hazards and state regulations; waste disposal practices in the oil and gas production industry; principles and practical application of biological filtration in waste treatment; public relations; the role of water supply in public health; extended aeration process in operation maintenance; minutes of the twenty-sixth annual Short Course for superintendents and operators of water, sewerage and industrial wastes disposal systems.

PB-166 138 Div. 13
OTS Prices: HC $5.00/MF $1.00

Louisiana State Univ., Baton Rouge.
THE INVESTIGATION OF POST-TENSIONING OF CONTINUOUS PRESTRESSED CONCRETE GIRDERS OF VARYING CROSS-SECTIONS WITH STRAIGHT TENDONS.
Engineering Research bulletin,
by Blaise Marvin Carriere and Elvin Joseph Dantin.
1964, 166p LSU-ERB-77

Unclassified report

Descriptors: (*Beams, Stresses), (*Reinforced concrete, Beams), Steel, Equations, Analysis, Loading (Mechanics), Deflection, Tensile properties, Tests, Computers, Construction, Failure (Mechanics), Experimental data.

It is the purpose of the paper to present a method for the analysis and design of continuous prestressed concrete girders of variable cross-section. An analysis and design procedure based on the 'slope deflection equations' and the stress equations due to prestressing are presented. The analysis is broken down into two parts. First the effects of dead and live loads are considered. Second the prestressing effects are considered. By using the principle of super-position the two effects are combined to complete the analysis. The calculation of the coefficients, fixed end moments, and the solution of the slope deflection equations are set up for the I.B.M. 1620 computer. To determine the applicability of the theoretical analysis four specially designed girders were constructed and tested. The experimental values were correlated with the theoretical values.

PB-166 264 Div. 13, 22
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
AIR BLAST LOADING ON ARCHES AND DOMES.
Final test rept. no. 13, (Rept. no. 15),
by E. V. Gallagher. Sep 58, 78p IITRI-D-144
Contract AF29 601 796, Proj. 1080, Task 10805
AFSWC TN58 26; AFSWP 1 08

Unclassified report

Report on Blast Effects on Buildings and Structures and Protective Construction. Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Shock waves, Structures), (*Airburst, Shock waves), Shock tubes, Model tests, Buildings, Hemispherical shells, Cylindrical bodies, Damage, Detonating cord, Blast, Pressure gages, Subsonic flow, Supersonic flow, Loading (Mechanics), Test methods, Drag.

Tests were conducted on solid models of arches and domes in the Air Force six-foot shock tube. Primacord high explosive was used to generate shocks ranging in strengths from about 1.3 to 7.0. This resulted in both subsonic and supersonic flows behind the shock front. Two arches and four domes were tested. The two arches were sections of circular cylinders and the four domes were sections of spheres. Measurements of point pressures at various points on the surface of each model were made. Flush-mounted miniature barium titanate pressure sensors were used to obtain individual pressure-time records for each gage position. The results obtained are in the form of pressure-time curves together with charts giving the numerical values of essential quantities. These quantities are normalized pressure and time values for critical points of the diffraction phase and drag coefficient for the pseudo-steady-state phase. Profiles showing the variation of these quantities with angle of incidence in the vertical plane are presented for the arches. Contour diagrams are utilized to express the variation of these quantities over the surface of the domes.

TIME- AND FREQUENCY-SPREAD CHANNELS,
by R. G. Gallager. 30 Apr 64, 40p LL-TR-352
Contract AF19 628 500
ESD TDR64 56

Unclassified report

Descriptors: (*Radio transmission, Distortion), (*Radiofrequency pulses, Distortion), Doppler effect, Scattering, Circuits, Wave transmission, Frequency shift, Band-pass filters, Mathematical analysis, Integral transforms, Statistical functions, Pseudo-random systems, Communication theory, Measurement, Analysis.

This report deals with the characterization and measurement of channels in which the input waveform is subject to both additive noise and to time and frequency spreading. Many spread channels are adequately characterized by any one of three functions of two variables: the scattering function, the tap-gain correlation function, and the two-frequency correlation function. These quantities are carefully defined and related by Fourier transform relationships. A number of interpretations are given for these functions, and the physical circumstances in which the functions provide meaningful characterizations of the channel are discussed. Techniques are given for measuring each of the above three functions. It is shown that the variance of these measurements approaches zero with the reciprocal of the measurement time. One of these techniques, using a chirp input signal to measure the two-frequency correlation function, appears to have definite advantages over the others, in terms of required measurement time and in ease of implementation. The analysis clears up some earlier paradoxes about measuring overspread channels and gives some insight into the relative merits of different input signals. (Author)

PB-166 087 Div. 8, 2
OTS Prices: HC $2.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
PRECIPITATION STATIC AND BLOWING SNOW IN ANTARCTICA.
Antarctic research and data analysis scientific rept. no. 5,
by J. R. Herman. 31 May 63, 48p RAD-TR-63-21
Grant NSF C255

Unclassified report

Descriptors: (*Precipitation static, Polar regions), (*Snow, Precipitation static), (*Noise (Radio), Precipitation static), Electrostatics, Atmospheric precipitation, Radio interference, Wind, Antennas, Signal-to-noise ratio, Low frequency, Medium frequency, High frequency, Atmospherics.

Electrostatically charged snow and ice particles blown up from the ground by high winds (blizzards) interact with exposed antennas and generate radio noise which can cause radio-communication failure or loss of data dependent on radio-measuring techniques. In this report, the U. S. National Bureau of Standards radio-noise data obtained at Byrd Station, Antarctica, during blowing snow are analyzed to establish the magnitude of such noise power, its frequency-dependence, and its relation to wind speed of the blizzard. Eight fixed frequencies between 51 kc and 20 mc are considered. It is shown that snow static associated with blowing snow can raise the noise power at least 50 db above atmospheric and manmade levels and, also, can cause loss of radio data 10 to 30 percent of the time in winter and spring months. For the frequency range of 51 kc to 2.5 mc, the noise field strength varies inversely with frequency, and the slope increases from -0.5 to -1.0 as the wind speed decreases from 57 to 21 knots. The field strength for 1.0 mc varies directly with wind speed. The noise power apparently decreases faster with increasing frequency above 2.5 mc than below it. Using the radio-noise data, it has been possible to deduce some properties of the snow particles borne along by the wind. In one case, the average electrostatic charge per particle has been found to be 1.1 (10 to the minus 15th power) coulombs, with the charge per gram of suspended snow being 2.7 (10 to the minus 10th power) coul/gm. (Author)

PB-166 234 Div. 8, 2
OTS Prices: HC $1.00/MF $0.50

Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
STUDIES ON PROPAGATION IN THE IONOSPHERE.
Quarterly progress rept. no. 4, for period ending 15 Jun 50.
15 Jun 50, 22p
Contract W36 039sc44518
ATI 81 601

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Aurorea, Ionospheric propagation), (*Radio waves, Ionospheric propagation), (*Ionospheric propagation, Radio waves), Radar equipment, Very high frequency, Scattering, Radio transmitters, Radar reflections, Spectroscopy, Atmospheric sounding, Low frequency, Atmospherics, Ionospheric, Disturbances.

The purpose of this task is to conduct research studies of the characteristics of the ionosphere particularly high frequency (HF) medium frequency (MF) and low frequency (LF) radio wave propagation during both the absence and the presence of auroral disturbances over Ithaca, New York. Work also includes auroral observations, and the design and construction of new spectrographs. A 50 Mc solar noise receiver and a five element Yagi antenna were used on several nights in an attempt to detect noise from the aurora. An attempt has been made to correlate data on the scattering of vhf signals from the aurora with reports of visual aurora. Analysis of ionospheric records and visual aurora data is being carried out. Measurements of the 150 kc pulse transmission from Penn State have been made consistently during the past quarter. The bibliography on radio phenomena associated with the aurora is essentially complete and will be published as a technical report in due course.

PB-166 237 Div. 8, 2
OTS Prices: HC $2.00/MF $0.50

Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
STUDIES ON PROPAGATION IN THE IONOSPHERE.
Quarterly progress rept. no. 10,
by W. Flood, B. Nichols, and R. Thayer.
15 Dec 51, 28p
Contract W36 039sc44518
ATI 123 993

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aurorae, Ionospheric propagation), (*Radio waves, Ionospheric propagation), (*Ionospheric propagation, Radio waves), Attenuation, Radar equipment, Very high frequency, Radio transmitters, Radar reflections, Atmospheric sounding, Atmospherics, Ionospheric disturbances.

The purpose of this task is to conduct research into the characteristics of the ionosphere at high, medium and low radio frequencies during both the absence and presence of auroral disturbances near Ithaca, New York.

by Y. Sekine. 28 May 62, 26p IER-60-450
Grant NSF G15965

Unclassified report

Descriptors: (*Optimization, Operations research), (*Linear programming, Operations research), Functions, Calculus of variations, Convex sets, Geometry, Iterative methods, Management engineering, Electric power production, Industrial production.

The objective of this research was the optimization of large systems which are composed of many interconnected subsystems. An interconnected electrical power system is an example of such a system. Another example is a manufacturing concern with several plants. Such a system could be optimized as a unit by conventional optimization procedures, but the dimension of such an optimization problem might be prohibitive. Considerable simplification can be effected by applying the decomposition principle of Dantzig and Wolfe who devised this method as a tool for solving the large scale linear programs of a special structure.

PB-163 972 Div. 15, 30
OTS Prices: HC $3.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
ANALYTIC REPRESENTATION OF A PERFECT PREDICTOR FOR A CLASS OF STATIONARY PROCESSES,
by J. F. A. Ormsby. 18 Dec 61, 55p IER-60-422
Grant NSF G15965

Unclassified report

Descriptors: (*Series, Time), (*Statistical processes, Mathematical prediction), (*Mathematical prediction, Statistical processes), Special functions (Mathematical), Bessel functions, Statistical functions, Integral transforms, Harmonic analysis.

Contents: The perfect predictor: Spheroidal function series representation; The exact interpolator Evaluation: Spheroidal function series; The perfect predictor: Legendre function series representation; Extending the class of lowpass processes; Verification of series representation of h sub alpha (tau); Computation formulae and evaluation results; Relationship of low and bandpass perfect predictors.

PB-163 973 Div. 15
OTS Prices: HC $2.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
EXISTENCE AND RELATIONSHIP OF A CLASS OF PERFECT PREDICTORS,
by J. F. A. Ormsby. 18 Dec 61, 44p IER-60-421
Grant NSF G15965

Unclassified report

Descriptors: (*Series, Time), (*Statistical processes, Mathematical prediction), (*Mathematical prediction, Statistical processes), Stochastic processes, Determinants, Statistical functions, Probability, Harmonic analysis, Integral transforms.

The existence of a perfect linear predictor is demonstrated for lowpass, bandpass, and highpass stationary processes. The results are also extended to a nonstationary model for processes based on those considered in the stationary case. In each case, the lowpass type result is first established using sampling theory and Wiener-Hopf relations or their time varying extensions. The lowpass case results in a predictor which can be specified over an arbitrary operation interval. The lowpass results are used to establish the existence of related perfect linear predictors for the highpass and bandpass type processes by means of certain frequency transformations. These transformations provide the basis for defining certain relationships between the magnitude of the Fourier transforms of the related predictors. For the nonstationary processes, these transforms are of the time varying type as noted above. Further, under an alternate interpretation a discussion is given on the nature of the resultant operation interval associated with predictions obtained by the transformations from the low pass cases. (Author)

PB-166 106 Div. 15
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
A BAYESIAN SOLUTION TO A SEQUENTIAL TWO-PERSON ZERO-SUM GAME,
by B. Gluss. 6 Aug 63, 15p ERL-63-18
Grant NSF G15965

Unclassified report

Descriptors: (*Game theory, Sequential analysis), (*Sequential analysis, Game theory), Probability, Equations, Optimization, Dynamic programming, Calculus of variations, Statistical functions, Sequences.

Two players are confronted with n machines that have known outcome probability distributions that are constant through time. They do not know, however, which machine is which. N trial pairs occur, each one of which comprises a play by each player on his selected machine. If Player 1 scores an amount x and Player 2 an amount y, then Player 2 pays Player 1 the difference x - y. The objective of the game is for both players to maximize their expected total discounted pay-offs over the N trials. A general solution is found, and some examples are given, including the two-armed bandit problem. (Author)

16. Medical Sciences

AD-442 436 Div. 16
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BIOLOGICAL-CHEMICAL PROTECTION FROM RADIATION [AND] PRACTICAL ORGANIZATION OF RADIATION PROTECTION,
by Ferenc Toth and Janos Barany. 28 May 64, 34p
FTD TT64 163; TT 64 71200

Unclassified report

Edited trans. of Magyar Radiologia (Hungary) 1963, v. 15, no. 4, p. 193-200, 208-214.

Descriptors: (*Radiobiology, Hungary), (*Radioprotective agents, Radiobioloby), (*Radiochemistry, Radioprotective agents), Microorganisms, Laboratory animals, Model tests, Organic compounds, Pharmacology, Drugs, Dosage, Enzymes, Whole body irradiation, Radiation effects, Bone marrow, Transplantation, X rays, Medical examination, Medical personnel, Medical equipment, Radioactive isotopes, Government (Foreign).

The use of ionizing radiation has made it necessary to study radioprotective measures. This paper presents a brief survey of the more important groups of radioprotective chemicals and also deals with the problem of the effect mechanism of such radioprotective substances. It also touches on problems involved in the use of the

14. Materials (Non-Metallic)

AD-283 784 Div. 14, 12
OTS Prices: HC $3.00/MF $0.50

Southwest Research Inst., San Antonio, Tex.
INVESTIGATION OF LUBRICANTS FOR SATELLITE AND SPACE VEHICLE INSTRUMENTATION.
Quarterly rept. no. 1, 1 Apr-30 Jun 62,
by R. D. Brown, R. A. Burton, and P. M. Ku. 27 Jul 62, 56p RS-356
Contract DA-36-039sc89207

Unclassified report

Descriptors: (*Lubricants, Space environmental conditions), (*Instrument greases, Spacecraft), Communication satellites (Active), Synchronous satellites, Control systems, Lubrication, Design, Environmental tests, Friction, Test equipment, Vacuum apparatus, Radiation damage, Bearings, Ball bearings, Materials.

This report describes an investigation of friction and wear in ultra-high vacuum. It is specifically directed toward the development of bearing material-lubricant combinations that will be suitable for long-term application in an environment such as encountered by communication satellites. The program has been planned around the application of twenty sliding friction and bearing test apparatuses, each contained in a separate glass chamber pumped by an ion pump. Four prototype sliding friction apparatuses have been fabricated and are in test operation at pressures as low as 6 X 10 to the minus 9th power torr. Prototypes of three different types of bearing test apparatuses have been fabricated.

AD-297 972 Div. 14, 12
OTS Prices: HC $4.00/MF $0.75

Southwest Research Inst., San Antonio, Tex.
INVESTIGATION OF LUBRICANTS FOR SATELLITE AND SPACE VEHICLE INSTRUMENTATION.
Quarterly rept. no. 3, 1 Oct-31 Dec 62,
by R. D. Brown, R. A. Burton, and P. M. Ku.
29 Jan 63, 104p RS-367
Contract DA-36-039sc89207

Unclassified report

See also AD-291 216

Descriptors: (*Lubricants, Satellites (Artificial)), (*Spacecraft, Lubricants), (*Space environmental conditions, Instrumentation), Friction, Wear resistance, Vacuum apparatus, Test methods, Ball bearings, Films, Molybdenum compounds, Silicides, Vibration.

The report describes the third three months' work on a program for the investigation of friction and wear in ultra-high vacuum. It is specifically directed toward the development of bearing-lubricant combinations that will be suitable for long-term application in an environment such as encountered by communication satellites. The results of six long-term sliding friction tests conducted in six small vacuum chambers at pressures in the 10 to the minus 9th to 10 to the minus 7th torr range are reported. Also reported are the results of five ball bearing tests conducted at pressures generally in the range of 10 to the minus 8th to 10 to the minus 6th torr. In the sliding friction tests, effective lubrication ($0.12<f<0.29$) has been provided by two MoS2 films throughout 200-days exposure to vacuum (generally around 10 to the minus 8th torr). In the bearing tests, a bearing lubricated by MoS2 film on the retainer has performed well throughout a 120-day period of exposure to vacuum. (Author)

PB-166 140 Div. 14, 13
OTS Prices: HC $3.00/MF $0.75

Louisiana State Univ., Baton Rouge.
INVESTIGATION OF PROPERTIES OF LIGHTWEIGHT CONCRETE.
Engineering Research bulletin for Jul 61-Oct 63,
by Dean C. McKee and Humphreys T. Turner. 1964, 92p LSU-ERB-74

Unclassified report

Descriptors: (*Concrete, Physical properties), Tensile properties, Clay, Sand, Absorption, Moisture, Compressive properties, Tests, Experimental data, Stresses, Strain (Mechanics).

The project was conceived with the purpose of investigating the shrinkage characteristics of lightweight concrete and some of the factors which may effect this particular property. The investigation was confined to concrete prepared from aggregates manufactured in Louisiana which are utilized in approximately 90% of the structural quality lightweight concrete produced in this state.

15. Mathematics

PB-163 970 Div. 15, 26, 32
OTS Prices: HC $1.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
OPTIMUM EXPANSION POLICIES FOR STOCHASTIC MULTI-COMPONENT SYSTEMS. II,
by Y. Sekine. 3 Aug 62, 19p IER-60-463
Grant NSF G19565

Unclassified report

Descriptors: (*Inventory analysis, Stochastic processes), (*Stochastic processes, Inventory analysis), Optimization, Decision theory, Convex sets, Linear programming, Calculus of variations, Probability, Determinants, Operations research, Statistical functions, Statistical distributions, Inventory, Stock level control, Inventory control, Logistics.

In this report the problem is considered of expanding a supply system in order to meet the increasing demand by adding new elements wherein the supply capacity changes with time deterministically or stochastically. This problem is related to a kind of stochastic inventory problem, and is distinguished from the inventory problems investigated so far in the following two points: (1) So far it has been assumed that the order is made based only on the stock at a time point; in other words, the order at any time point is not affected by how much quantity and what kind of commodities were ordered at each time point in the past. In the problem investigated in this paper, the quantity of the stock at a time point varies according to the whole history of past orders. Thus the past history plays an essential part in the decision making. (2) So far, the shortage of the supply was dealt with only by applying some penalties to the objective function. But in this paper, a different kind of constraint is imposed, i.e., it is assumed to be required that the probability of the supply exceeding the demand should be greater than a prespecified service level. Mathematically this can be regarded as a monotonic programming over non-convex constraints, and an application of integer linear programming.

PB-163 971 Div. 15, 26, 30
OTS Prices: HC $2.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
DECENTRALIZED OPTIMIZATION OF AN INTERCONNECTED SYSTEM,

P. LOPHURAE, AND P. CATHEMERIUM,
by Clay G. Huff. 16 Dec.53, 20p
Proj. NM005 048 01 07

Unclassified report

Descriptors: (*Birds, Plasmodium), (*Plasmodium, Morphology (Biology)), Infections, Parasitic diseases, Hemosporidia, Erythrocytes, Tissues (Biology).

The diameter of merozoites was chosen as the quantitative measure for comparison of exoerythrocytic stages of avian malaria, since it was possible to obtain this measurement with the greatest accuracy. Statistical studies, using this measure, on the exoerythrocytic stages of P. gallinaceum, P. lophurae, P. fallax, and P. cathemerium revealed the following information: (1) The mean diameter of P. gallinaceum was significantly smaller than the diameters of P. fallax and P. lophurae; the diameters of the latter two species were not significantly different. The morphology of the merozoites of P. cathemerium is such as to prevent the use of the diameter as a measure of comparison of merozoite size with the other three species. (2) Significant differences were found between the merozoites in certain individual hosts of the same species and between the merozoites of P. gallinaceum in the duck and the quail. These differences between the parasites in different individuals of the same species and in different species of host were of the same order of magnitude. (3) Significant differences among merozoites from different organs of the host were found only between those of P. gallinaceum in the brain of the chick as compared with those in spleen, lung, and kidney. A corresponding difference was not found between the merozoites of P. fallax in the brain and lung of the turkey. (4) The merozoites of P. gallinaceum in blood-induced infections were significantly smaller in early (4-day) as compared with late (10-, 16-, 17-day) infections. This smaller size of the merozoites in early, blood-induced infections is interpreted as a persistence of a characteristic of the parasite following a conversion of its host cell preferences from erythrocytes to cells other than erythrocytes. The differences between 5-day and 10-day merozoites from sporozoite-induced infections were not significant. (Author)

PB-160 122 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
MOLECULAR KINETICS OF MUSCLE ADENOSINE TRIPHOSPHATASE.
Research rept., vol. 10, p. 415-432,
by Ludovic Ouellet, Keith J. Laidler, and Manuel F. Morales. 25 Apr 52, 26p
Proj. NM000 018 04 07

Unclassified report

Descriptors: (*Muscles, Adenosine phosphates), (*Adenosine phosphates, Reaction kinetics), Muscle proteins, Enzymes, Hydrolysis, Thermodynamics, Ph, Ions, Equations.

PB-160 129 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
OBSERVATIONS ON PLASMODIUM HUFFI MUNIZ, SOARES, AND BATISTA.
Research rept., vol. 11, p. 21-26,
by Clay G. Huff. 8 Jan 53, 6p
Proj. NM005 048 01 04

Unclassified report

Descriptors: (*Birds, Plasmodium), (*Plasmodium, Life cycle, Parasitic diseases, Infections, Erythrocytes, Hemosporidia, Morphology (Biology), Histological techniques.

Study of histological preparations from a toucan, Ramphastos toco infected with Plasmodium huffi, Muniz, Soares, and Batista, 1951 indicate: 1) that the infection described as P. huffi was probably a mixed one; 2) that the exoerythrocytic stages were predominately of the elongatum-type; 3) that the exoerythrocytic stages resemble those of P. elongatum in their spherical form and self-limitation in size of the schizonts; and 4) that the exoerythrocytic stages differ from those of P. elongatum in producing a larger number of merozoites and in effecting abnormal changes in some infected host cells. (Author)

PB-160 132 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
OBSERVATIONS ON THE PRE-ERYTHROCYTIC STAGES OF PLASMODIUM RELICTUM, P. CATHEMERIUM, AND P. GALLINACEUM IN VARIOUS BIRDS,
by Clay G. Huff. 26 May 50, 20p
Proj. NM005 048 01 01

Unclassified report

Descriptors: (*Birds, Plasmodium), (*Plasmodium, Life cycle), Parasitic diseases, Hemosporidia, Morphology (Biology), Erythrocytes, Tissues (Biology), Antimalarials, Immunity, Infections.

Search for pre-erythrocytic stages of Plasmodium relictum, Plasmodium cathemerium, and Plasmodium gallinaceum in 15 new parasite-host combinations resulted as follows: Neither pre-erythrocytic nor erythrocytic stages were found in the following combinations: P. relictum in chickens or guinea fowl, P. cathemerium in ring neck doves, P. gallinaceum in guinea fowl, California valley quail, or ring neck doves; pre-erythrocytic but no erythrocytic stages were found in: P. relictum in turkeys, pheasants, and ducks, P. cathemerium in ducks P. gallinaceum in turkeys and canaries; both pre-erythrocytic and erythrocytic stages were found in canaries inoculated with sporozoites of P. cathemerium and in pheasants inoculated with sporozoites of P. gallinaceum; erythrocytic but no pre-erythrocytic stages were found in domestic pigeons inoculated with sporozoites of P. gallinaceum. In the 21 parasite host combinations represented in this and previous work pre-erythrocytic stages were found in 13 (or 61.9%) of them, while erythrocytic stages were found in only 6 (or 28.6%) of them. No clear relationship was discovered between the ability of sporozoites to develop in the tissues of hosts and the systematic classification of the hosts.

PB-160 136 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ON THE INTERACTION OF MYOSIN WITH ADENOSINE TRIPHOSPHATE.
Research rept., vol. 10, p. 869-892,
by Jacob Joseph Blum and Manuel F. Morales.
12 Dec 52, 28p
Proj. NM000 018 04 10

Unclassified report

Descriptors: (*Muscle proteins, Adenosine phosphates), (*Adenosine phosphates, Muscle proteins), Enzymes, Hydrolysis, Scattering, Equations.

A light-scattering study has been made of the interaction of adenosine triphosphate (ATP) with myosin, using for the analysis the extrapolation method of B. H. Zimm. Certain ultracentrifugal observations supplemented the study. Addition of ATP to dilute solutions of either 5- or 24-hour rabbit myosin extracts causes a reversible shape change at constant molecular weight, indicating no

marrow transfusion. (Toth) The practical organization of radiation protection is a many-sided and very extensive problem. The present paper provides a brief survey of the problem, indicating certain shortcomings and the measures necessary to correct them. (Barany)

PB-160 081 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
PENETRATION OF HOST SKIN BY CERCARIAE OF SCHISTOSOMA MANSONI. I. OBSERVED ENTRY INTO SKIN OF MOUSE, HAMSTER, RAT, MONKEY, AND MAN.
Research rept., vol. 14, p. 475-502,
by Margaret A. Stirewalt Lincicome. 14 Jun 56, 32p
Proj. NM005 048 02 34

Unclassified report

Descriptors: (*Schistosoma, Penetration), Larvae, Trematodes, Mammals, Skin, Mice, Hamsters, Rats, Monkeys, Humans.

Observation of cercariae of Schistosoma mansoni on skin of a variety of mammalian hosts revealed the following facts. Entry sites varied in different host skin, but breaks, bends, angles and frank openings all featured in cercarial penetration. Sites of choice were in the walls of wrinkles in human skin; by hair follicles in tail skin of haired mice. Adult human and monkey skin and tail skin of haired mice were penetrated by over 85 percent of the applied cercariae; ear and body skin of adult hairless mice, body skin of adult hamsters and of 4- to 5-day-old mice, by 73 to 78 percent; body skin of 1- to 2-day-old mice and tail skin of adult hairless mice, by 65 and 62 percent, respectively; and body skin of 5-day-old rats, by 34 percent. Time spent in exploration averaged about 1 minute on human skin and over 4 minutes on body skin of 5-day-old rats, with variation within these limits on other skins. Actual entry time varied from about 3 minutes into body skin of baby mice and ear and body skin of adult hairless mice to about 7 minutes into body skin of baby rats, tail skin of adult hairless mice, body skin of adult hamsters, and adult human skin. Patterns of penetration and migration were essentially similar on all skin. Penetration involved orientation to the entry site, close oral attachment, enormous muscular activity and grandular secretion. Migration was accomplished by a combination of muscular and glandular activity with constant oral exploration until yielding intercellular paths were encountered. (Author)

PB-160 087 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A PHARMACOLOGICAL STUDY OF SOME SYNTHETIC ANTICHOLINESTERASES OF THE SUBSTITUTED ETHYLENE DIAMINE TYPE.
Research rept., vol. 14, p. 541-554,
by H. D. Baldridge, E. B. Cook, S. L. Friess, D. J. Jenden, and J. R. Tureman. 29 Jun 56, 17p
Proj. NM000 018 12 06

Unclassified report

Descriptors: (*Acetylcholinesterase, Inhibition), (*Pharmacology, Acetylcholinesterase), Ethylendiamine, Indole alkaloids, Drugs, Autonomic agents, Skeletal muscle relaxants, Piperidines, Iodides, Pyrroles, Physostigmine, Parasympathomimetic agents, Tissues (Biology), Lethal dosage, Toxicity.

Some potent inhibitors of acetylcholinesterase have been tested on a series of isolated tissues and in intact cats and mice and compared with some less active derivatives and with eserine as a reference drug. In regard to pharmacological actions generally thought to be dependent on cholinesterase inhibition, all the compounds showed about the same order of activity, which was 100 to 1,000 less than that shown by eserine. Other actions were also produced which were not directly attributable to cholinesterase inhibition, such as ganglionic and neuromuscular stimulation by DMPi and neuromuscular block of the competitive type by alpha-Me TMPi. The possible reasons for the relative lack of activity on living tissues have been examined and evaluated, and it has been concluded that fixation in tissues by protein binding is the most probable explanation. (Author)

PB-160 099 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A PREPARATION OF CYSTEINE HYDROCHLORIDE USING RADIOACTIVE SULFUR(35).
Research rept., vol. 12, p. 41-46,
by J. W. Duckworth, G. W. Imirie, and R. Sharp.
15 Feb 54, 6p
Proj. NM006 012 05 13

Unclassified report

Descriptors: (*Amino acids, Synthesis (Chemistry)), (*Labeled substances, Amino acids), Sulfur, Tracer studies, Hydrolysis, Hydrochloric acide.

Relatively pure cysteine hydrochloride containing radioactive sulfur(35) was prepared using established synthesis procedures for this compound. Simplicity of operation and good control of radioactive hazards are featured. (Author)

PB-160 112 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE MECHANISM OF POTENTIATION OF ACETYLCHOLINE BY ESERINE ON THE FROG RECTUS ABDOMINIS.
Research rept., vol. 13, p. 729-740,
by Donald J. Jenden and Charles E. Knight.
24 Oct 55, 13p
Proj. NM000 018 12 02

Unclassified report

Descriptors: (*Acetylcholine, Muscles), (*Muscles, Acetylcholine), Indole alkaloids, Cholinesterase, Enzymes, Amphibians, Biochemistry.

The potentiation of acetylcholine by eserine on the frog rectus abdominis has been examined quantitatively in the light of the diffusion kinetics of acetylcholine in the muscle. The data are consistent with the localization of cholinesterase to the immediate vicinity of the endplate, and suggest that potentiation results mainly from inactivation of this barrier. In some experiments there was evidence that the average concentration of ACh in the extra-cellular space was lowered by hydrolysis by ChE, but generally this was not detectable. The dissociation constant between ChE and eserine was estimated at 11.2 x 10 to the minus 7th power ± 0.7 (P=.05). This is approximately 20 times greater than published estimates on isolated acetylcholinesterase, and it is suggested that this difference can probably be best accounted for as an alteration in the properties of the enzyme resulting from its environment and binding at its natural site. (Author)

PB-160 113 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
MEROZOITE SIZE IN EXOERYTHROCYTIC INFECTIONS OF PLASMODIUM GALLINACEUM, P. FALLAX,

hundred and fifty times smaller with TPP as the substrate than with ATP as the substrate. It has been known for some time that TPP is practically ineffective in deforming myosin while ATP is very effective. These results are taken as indicative that the deformation of the myosin enzyme by the substrate is associated with ability of the substrate to bind on the enzyme rather than with the rate at which the substrate can be hydrolyzed. (Author)

PB-160 163 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
LONG-TERM OBSERVATIONS OF RADIATION CHANGES IN SALIVARY GLANDS AND THE GENERAL EFFECTS OF 1,000 r TO 1,750 r OF X-RAY RADIATION LOCALLY ADMINISTERED TO THE HEADS OF DOGS.
Research rept., vol. 12, p. 361-374,
by James A. English, Merrill G. Wheatcroft, H. W. Lyon, and Clarence Miller. 21 Sep 54, 14p
Proj. NM006 012 04 74

Unclassified report

Descriptors: (*Salivary glands, Radiation effects), (*Radiation effects, Salivary glands), Head, Partial body irradiation, Radiological dosage, Histological techniques, Tissues (Biology), Cells (Biology), Morphology (Biology), Glands, Pathology, Wounds and injuries, Hemorrhage, Dogs.

Considerable morphologic alteration was observed in the salivary glands of dogs which had received 1,750 r of 200 KVP X-ray radiation locally to the head. From a total of 6 dogs which were irradiated, 5 were sacrificed during a 5 to 16 months' period following exposure and provided the experimental material for histologic study. Normal glands were obtained from 7 unirradiated dogs for comparison. The parotid, submaxillary, and sublingual glands of 3 dogs which received 1,750 r and were sacrified 25, 29, and 34 weeks later, were atrophied, fibrosed, and altered in morphologic detail. Except for knowledge of the anatomic areas from which the tissues were taken, or by special staining reactions, it would have been impossible to identify many tissue sections. The severe changes consisted in various grades of obliteration of acini, leaving whorls of nuclei in streaked concentric patterns, fragmented cells, groups of cells without pattern, partly damaged acini in which one or two cells were identifiable and the rest were vacuolated or in signet-ring configuration. A dog receiving the same amount of treatment which was sacrificed 58 weeks afterwards, had much less apparent total damage, but in many areas some of the changes described above could be found. A dog receiving 1,000 r and sacrificed 68 weeks afterwards had relatively normal-appearing salivary glands. (Author)

PB-160 164 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
LYSERGIC ACID DIETHYL AMIDE (LSD-25) A CLINICAL-PSYCHOLOGICAL STUDY.
Research rept.,
by Charles Savage. 9 Sep 51, 12p
Proj. NM001 056 06 02

Unclassified report

Descriptors: (*Lysergic acids, Psychiatry), (*Abnormal psychology, Lysergic acids), Psychotropic agents, Drugs, Dosage, Physiology, Anxiety, Psychoses, Mental disorders, Reaction (Psychology), Psychophysiology, Sensory perception, Personality.

A study has been made of the effects of lysergic acid diethyl amide (LSD-25 Sandoz) on the affect, cognition, and expression of five normal subjects and 15 depressed patients. The normal received a single oral dose of 20 micrograms. The patients received between 20-100 micrograms by mouth daily for a month. Physiological reactions included rise in blood pressure and pulse rate, mydriasis, and incoordination; but in a few cases there was a profound fall in blood pressure and pulse rate. Unpleasant side effects were nausea, parethesias, and tension. Mental changes included euphoria or dysphoria, and hallucinations of all modalities. Ideas were transmitted into visual hallucinations of extraordinary plasticity. Most patients reacted with anxiety to these distortions in reality and became constricted. Infrequently the doctor-patient relationship was improved with free expression of affect (but not content). Occasionally the latent content of the hallucinations was elicited by free association. Of 15 depressed patients three recovered to their pre-psychotic level, four recovered from their depression and were considered improved, while four derived no benefit. The treatment of four was discontinued prematurely. LSD appears to have no specific therapeutic advantage in depression. Results from its use were not better than among matched control cases. But analysis of LSD-induced hallucinations may prove of value in psychotherapy. (Author)

PB-160 165 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DECREASE OF ADRENAL ASCORBIC ACID AND CHOLESTEROL IN THE RAT AND GUINEA PIG, FOLLOWING LARGE DOSES OF GLUTATHIONE,
by M. M. Carey, E. P. Vollmer, R. L. Zwemer, and D. L. Spence. 27 Dec 50, 10p
Proj. NM007 081 11 01

Unclassified report

Descriptors: (*Glutathione, Ascorbic acid), (*Toxic tolerances, Glutathione), Cholesterol, Adrenal glands, Adrenal cortex hormones, Toxicity, Potassium, Dosage, Radioprotective agents, Guinea pigs, Rats.

Glutathione, in a dosage that increases potassium tolerance in mice (400 mg/100 gm. body weight) decreased adrenal ascorbic acid and cholesterol in rats and guinea pigs. Adrenal recovery occurs within 24 hours in rats but takes longer in guinea pigs. Glutathione also gave evidence of toxicity, having an LD50 of 300 and 830 mg/100 gm. for guinea pigs and mice, respectively, and an approximate MLD of 700 mg/100 gm. for rats. (Author)

PB-160 167 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DEMONSTRATION OF AN ENZYMATIC FACTOR IN CERCARIAE OF SCHISTOSOMA MANSONI BY THE STREPTOCOCCAL DECAPSULATION TEST.
Research rept., vol. 10, p. 255-268,
by M. A. Stirewalt and A. S. Evans. 3 Jun 52, 14p
Proj. NM005 048 02 27

Unclassified report

Descriptors: (*Schistosoma, Hyaluronate lyase), (*Hyaluronate lyase, Schistosoma), (*Streptococcus, Hyaluronate lyase), Enzymes, Larvae, Trematodes, Bacteria, Gastropoda, Biological assay.

A thermolabile factor in cercariae of Schistosoma mansoni which markedly reduces the capsular zones of group C mucoid beta hemolytic streptococci in vitro is qualitatively demonstrated without the necessity of incubation of the cercariae with hyaluronate. With this method of assay, the activity of the enzyme produced by the bacteria unavoidably present in cercarial suspensions

depolymerization into 'actin' and 'myosin-A'. At all times during the interaction with ATP the myosin particles appear to be roughly cylindrical. Addition of ATP causes an extension of these cylinders, followed by a contraction after sufficient ATP is enzymatically hydrolyzed. Shape at any instant appears to be strictly determined by ATP concentration; the velocity constant of dephosphorylation can be obtained from light-scattering data alone, as well as from phosphate measurement. Between the fifth and twenty-fourth hours of extraction the myosin particles are progressively aggregated. This aggregation is not due to the progressive addition, in substantial quantities, of a non-ATPase component. In the light of present evidence, the interaction of ATP and myosin can be plausibly explained by adopting an entropic-electrostatic model of the myosin particle. (Author)

PB-160 137 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ON THE Mg(II) ACTIVATION OF ACETYL CHOLINESTERASE.
Research rept., vol. 12, p. 269-274,
by S. L. Friess, Irwin B. Wilson, and Enrico Cabib.
26 Jun 54, 6p
Proj. NM000 018 06 32 Unclassified report

Prepared in cooperation with Columbia Univ., New York. Coll. of Physicians and Surgeons.

Descriptors: (*Acetylcholinesterase, Reaction kinetics), Enzymes, Magnesium, Ions, Citrates.

Preparations from two different laboratories of the enzyme acetyl cholinesterase derived from electric eel tissue have been observed to vary in their response to magnesium ion as an activator, and to complexing substituents like versene and citrate ions as deactivators. For example, the activity of enzyme from the Bethesda laboratories could be enhanced by roughly a factor of 6 by a 0.01 M. concentration of the divalent cation, while preparations from the Nachmansohn-Wilson laboratories at Columbia University were activated to the extent of about 20 percent by this ionic concentration. The experimental basis for this difference in behavior has now been found to lie in the degree of aging of a diluted solution of the highly sensitive enzyme variant. Whereas dilutions of a concentrated stock solution tested immediately after dilution show this high susceptibility to magnesium activation, if these dilutions are allowed to age at 3 - 4C. for about 60 hours before testing, their sensitization properties fall to the levels characteristic of the relatively insensitive preparations. (Author)

PB-160 144 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
NATURE OF THE ACETYL CHOLINESTERASE SURFACE. II. RING EFFECT IN ENZYMATIC INHIBITORS OF THE SUBSTITUTED ETHYLENE DIAMINE TYPE.
Research rept., vol. 12, p. 21-24,
by S. L. Friess and W. J. McCarville. 2 Feb 54, 6p
Proj. NM000 018 06 33 Unclassified report

Descriptors: (*Acetylcholinesterase, Inhibition), Enzymes, Ethylenediamine, Indole alkaloids, Chlorine, Parasympathomimetic agents, Electrons, Heterocyclic compounds, Hydrolysis.

PB-160 145 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
NATURE OF THE ACETYLCHOLINESTERASE SURFACE. IV. THE CONTROL OF ENZYMATIC INHIBITION BY BASICITY IN THE SUBSTITUTED ETHYLENE DIAMINES.
Research rept., vol. 13, p. 553-564,
by S. L. Friess and H. D. Baldridge. 18 Aug 55, 14p
Proj. NM000 018 06 41
Unclassified report

Presented, in part, at the national meeting of the American Physiological Society, San Francisco, Calif., 10-15 Apr 55.

Descriptors: (*Acetylcholinesterase, Inhibition), (*Ethylenediamines, Ph), Enzymes, Amines, Ionization, Bases (Chemistry), Piperidines, Pyrroles, Heterocyclic compounds.

Diamines (DMPy, DMPi) have been shown in previous work to be powerful inhibitors of the enzyme acetylcholinesterase. The present study was concerned with the relationship between inhibitory strength and the basicity of these amine functions. Apparent ionization constants were determined by potentiometric titration, and provisional assignment of these values were made on the basis of enzymatic evidence. A study of the effect of pH on percentage inhibition of the enzyme at fixed inhibitor concentration indicates that monotertiary species is the effective form of the inhibitor in the pH range 5.5-7.5. (Author)

PB-160 152 Div. 16, 15
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A NOTE ON THE DIFFERENTIAL EQUATION OF SIMPLE ENZYME KINETICS.
Research rept., vo. 13, p. 753-758,
by Manuel F. Morales and David E. Goldman.
7 Nov 55, 6p
Proj. NM000 018 11 04
Unclassified report

Descriptors: (*Reaction kinetics, Enzymes), (*Differential equations, Biochemistry), (*Enzymes, Differential equations), Analog computers, Programming (Computers), Physiology.

There is derived the exact differential equation (relating substrate concentration to time) corresponding to the classical Michaelis theory of enzyme action. This equation is thrown into a very revealing form wherein the usual steady state constants of the system appear as natural parameters. From this form there are readily derived simple approximate expressions describing the transient state. The form is also suitable for machine coding. (Author)

PB-160 155 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
KINETIC STUDIES OF THE MYOSIN-TRIPOLYPHOSPHATE SYSTEM.
Research rept., vol 13, p. 331-338,
by Eugenia Tarver Friess and Manuel F. Morales.
29 Jun 55, 9p
Proj. NM000 018 11 03
Unclassified report

Descriptors: (*Muscle proteins, Reaction kinetics), (*Phosphates, Muscle proteins), Hydrolysis, Adenosine phosphates, Enzymes, Ionization, Chemical bonds.

From a kinetic analysis of the myosin-tripolyphosphate (TPP) system it is concluded that the maximum rate of hydrolysis of tripolyphosphate is almost one-fifth of that achieved with adenosine triphosphate (ATP); on the other hand, the affinity constant of substrate for enzyme is one

PB-160 183 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACETYCHOLINESTERASE SURFACE. VI. FURTHER STUDIES WITH CYCLIC ISOMERS AS INHIBITORS AND SUBSTRATES.
Research rept., vol. 13, p. 851-860,
by S. L. Friess and H. D. Baldridge. 6 Dec 55, 12p
Proj. NM000 018 12 04

Unclassified report

Descriptors: (*Acetylcholinesterase, Inhibition), Enzymes, Isomerases, Alcohols, Acetates, Cyclopentanes, Cyclohexanes, Hydrolysis.

In further study of topographical features of the enzyme acetylcholinesterase from electric eel tissue, the cis and trans isomers of d,l-2-trimethylaminocyclopentanol iodide and the corresponding acetates have been prepared and tested for their activities as enzymatic inhibitors and substrates, respectively. The inhibition data indicate that the cis-alcohol offers a better fit to the catalytic surface than its trans counterpart, with both derivatives possessing greater power than choline. Similarly, on the basis of two criteria of acceptability, the cis acetate is a better substrate than the trans, and both surpass the natural substrate acetylcholine in fit to the catalytic surface. The body of evidence from both the cyclopentane and cyclohexane derivatives is in accord with a maximum distance of about 2.5 A between anionic and esteratic sites on the surface. (Author)

PB-160 184 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACETYLCHOLINESTERASE SURFACE. VII. INTERFERENCE WITH SURFACE BINDING AS REFLECTED BY ENZYMATIC RESPONSE TO TURICINE, BETONICINE, AND RELATED HETEROCYCLES.
Research rept., vol. 14, p. 641-650,
by S. L. Friess, A. A. Patchett, and B. Witkop.
4 Oct 56, 12p
Proj. NM000 018 12 07

Unclassified report

Descriptors: (*Acetylcholinesterase, Inhibition), Alcohols, Cholines, Pyrroles, Enzymes, Hydrolysis, Chemical bonds, Catalysis, Carbon compounds, Reaction kinetics.

The response of the enzyme acetylcholinesterase to inhibition by the betaine amino alcohols D- and L- turicine (III, IV) and L-betonicine (V) is remarkably sensitive to the relative spatial orientations of the -COO(-) and -OH groups. When trans to one another as in V inhibition of the low order of strength shown by choline results, while in the cis derivatives III and IV no inhibition is observed even at concentrations two orders of magnitude higher. The anilide of V essentially repeats this picture, indicating that the effect of the 2-substituent on the pyrrolidine ring is steric and not electrostatic in character. This difference is discussed in terms of two-point attachment to the catalytic surface, and steric interference with this binding when the 2-substituent is necessarily oriented toward the protein surface as compared with no hindrance to binding when the group is directed away from the surface. Additional information on the nature of the binding in these heterocycles comes from comparison of the relative inhibitory strengths of III, IV, and V with those of the betaine of hydroxypipecolic acid (VIII), stachydrine (IX) and the methiodide of N-methylpyrrolidine (X). Measurements with compounds IX and X indicate that removal of the -OH function leads to a drop in inhibitory power as compared with betonicine. The acetates of betonicine and turicine appear to be accepted as substrates for the enzyme, but the enzymatic hydrolytic rates are not appreciably higher than those for the 'uncatalyzed' water reaction of the betaine esters. (Author)

PB-160 190 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ALBINO MOUSE AS A LABORATORY DEFINITIVE HOST FOR SCHISTOSOMA MANSONI.
Rept. no. 23,
by A. S. Evans, Robert E. Kuntz, and M. A. Stirewalt.
24 Aug 49, 16p
Proj. NM005 004(X535)

Unclassified report

Descriptors: (*Chemotherapy, Schistosoma), (*Schistosoma, Life cycle), (*Mice, Schistosoma), Diseases, Larvae, Trematodes, Worms, Pathology, Infections, Drugs.

The albino mouse was evaluated as a definite host for Schistosoma mansoni. It was found that a relatively consistent number of the cercariae reach maturity, viable ova are passed in the feces, and the gross pathology encountered closely simulates that reported in human cases. The white mouse is especially recommended as the host of choice for drug screening in infections with S. mansoni. Exposures should be limited to 200 cercariae or less, and autopsies performed between the sixth and tenth weeks of the infection. No diminution in the numbers of adult worms was noted as the infections aged. (Author)

PB-160 194 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AN ANALYSIS OF THE EFFECTS OF TOTAL-BODY X-IRRADIATION ON THE BODY WEIGHT OF WHITE SWISS MICE. I. THE WEIGHT AND MORTALITY RESPONSE OF MALE AND FEMALE MICE IN THE LETHAL X-RAY DOSE RANGE.
Research rept., vol. 12, p. 317-332,
by William H. Chapman. 14 Aug 54, 22p
Proj. NM006 012 04 67
AD 46 494

Unclassified report

Descriptors: (*Whole body irradiation, Body weight), (*Radiological dosage, Radiation damage), Lethal dosage, Radiation effects, Males, Females, Mice.

The characteristic weight responses for 60- to 80-day-old male and female mice exposed to lethal doses of total-body X-radiation have been demonstrated. The weight curves reflect the degree of radiation damage and exhibit different characteristics of different dose range levels. Male mice gained proportionately more weight than female mice exposed to X-ray doses of 740 r or less, and lost proportionately more weight than the females, following X-ray doses in excess of 740 r. Male 28-day survivors of X-ray doses in the mid-lethal or high-lethal dose ranges showed the greatest weight loss at two weeks after irradiation (13.6 percent weight lost by 890 r survivors on the 12th postirradiation day). Female 28-day survivors of equivalent X-ray doses sustained the greatest weight loss on the fourth postirradiation day (11.2 percent weight lost by 890 r survivors on the fourth postirradiation day). The 28-day mortality of male mice was consistently greater than that of female mice exposed to the same respective doses within the LD 0 to LD 100 mortality range. (Author)

PB-160 196 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medicial Research Inst., Bethesda, Md.
ANALYTICAL DESCRIPTION OF THE EFFECTS OF MODIFIERS AND OF ENZYME MULTIVALENCY UPON THE STEADY STATE CATALYZED REACTION RATE.

has been separated from that of the cercariae. On the basis of the reaction and the comparable effect of bull-testis hyaluronidase it is suggested that the factor demonstrated is an enzyme or enzyme system of the hyaluronidase complex. (Author)

PB-160 171 Div. 16, 25
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE DETECTION AND MEASUREMENT OF FREEZING IN TISSUE.
Research rept., vol. 11, p. 9-20,
by Harold T. Meryman and John W. Moore. 6 Jan 53, 16p
Proj. NM000 018 01 06

Unclassified report

Descriptors: (*Tissues (Biology), Freezing), (*Frostbite, Tissues (Biology)), Ice, Crystallization, Thermal properties, Mechanical properties, Electrical properties, Acoustic properties, Wounds and injuries, Microwave frequency.

The problem of positive identification of crystalline freezing in experimental or clinical frostbite is of considerable importance. In an effort to provide a practical method for ice detection and evaluation, the thermal, mechanical, electrical and acoustic differences between frozen and unfrozen tissue have been considered and their measurement investigated. The most successful method to date has been microwave reflection. The 3.31 cm. wave (X Band) was led through a slotted probe and a tapered wave guide section to the tissue. The standing wave nodal shift, as measured by the probe, was proportional to the thickness of frozen tissue. (Author)

PB-160 179 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
DOSE DEPENDENCE AND SEQUENTIAL CHANGES IN MOUSE SMALL INTESTINAL WEIGHT INDUCED BY IONIZING RADIATION.
Research rept., vol. 12, p. 375-384,
by Robert A. Conard. 21 Sep 54, 14p
Proj. NM006 012 04 70

Unclassified report

Descriptors: (*Radiological dosage, Intestines), (*Intestines, Radiation effects), Weight, Dosimeters, Lethal dosage, Radiobiology, Radioactive isotopes, X rays, Gastrointestinal system, Mice, Rats.

Dose dependence of small intestinal radiation induced weight loss of mice may be used as a biological dosimeter when measured two days postirradiation throughout the lethal range of radiation. This technique was designed and used successfully for biological measurement of rem dosage of neutron radiation in atomic bomb field tests. Intestine weight changes in male Carworth Farms (C.F.) mice with 2,000 KVP X-ray and male white Swiss mice with gamma radiation were dose dependent between doses of 150-950 r when measured two days postirradiation. Doses above 950 r showed no further two day weight loss, thus resulting in a plateau effect. Under properly controlled conditions this technique may be used to determine dosage of rem, relative biological effectiveness of various types of radiation, strain and species difference in response, effects of protective agents, and the relative sensitivity of the gastrointestinal tract to various qualities of radiation as compared with other tissues. Based on these and other studies, it was shown that the rat small intestine is about 1.7 times as sensitive to radiation as the mouse small intestine. Sequential weight changes in the small intestine were studied after various doses of gamma radiation in white Swiss mice. Radiation was followed by rapid weight loss in the gut (dose dependent) reaching a maximum by the second or third day followed by recovery above control range at three to five days. The magnitude of this peak recovery tended to increase with dosage up to 750 r and to be somewhat delayed with increasing dose.

PB-160 181 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ABSORPTION OF X-RAYS BY TISSUES OF THE HEAD AND NECK.
Research rept., vol. 10, p. 861-868,
by M. G. Wheatcroft and J. E. Morgan. 16 Dec 52, 10p
Proj. NM006 012 04 61

Unclassified report

Descriptors: (*Radiation effects, Head), (*Salivary glands, Radiation effects), Teeth, Mouth, Radiological dosage, Skin, X rays, Absorption (Biology), Radiobiology, Dogs.

Relative doses of 200 KVP x-rays received by the salivary glands, teeth and mandible during unilateral and bilateral exposure were measured by the Victoreen condenser r meter. During bilateral x-irradiation of salivary glands of dogs the parotids received a larger dose than any other tissue and this was approximately 60 percent more than the claculated air dose. During bilateral x-irradiation of the teeth and mandible, the skin received a larger dose than the other tissues and this was approximately 50 percent more than the calculated air dose. During bilateral x-ray exposure the total dose to any tissue is the arithmetical sum of the individual doses from each side and this varies according to tissue absorption of x-rays. (Author)

PB-160 182 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ACETYLCHOLINESTERASE SURFACE. V. SOME NEW COMPETITIVE INHIBITORS OF MODERATE STRENGTH.
Research rept., vol. 37, p. 779-786,
by S. L. Friess and H. D. Baldridge. 9 Nov 55, 9p
Proj. NM000 018 12 03

Unclassified report

Descriptors: (*Acetylcholinesterase, Inhibition), Enzymes, Nitrogen, Carbon compounds, Chemical bonds, Iodides, Piperidines, Equations.

Diamines monomethiodides have previously been shown to be strong in vitro inhibitors of the enzyme acetylcholinesterase, when the alpha and beta carbons are unsubstituted. It has now been observed that substitution of a single methyl group at either of these two carbon atoms lowers the strength of inhibition sharply, with enzyme-inhibitor dissociation constants rising by a factor of more than 100 and that substitution at the beta carbon is slightly more potent than at the alpha position in this respect. These facts are in accord with the results of others on the effectiveness of certain acetyl choline analogs, investigated as a function of chain branching at the two methylene groups. As a further finding on the requirement of a polymethylated nitrogen atom for effective binding at the catalytic surface, the two methyl groups of Ia were replaced by ortho ring carbon atoms in the second ring of ethylene dipiperidine (VIII), resulting in a large drop in enzymatic inhibitory power. The addition of a single quaternizing methyl group as in IX again raises the inhibitory strength by a considerable factor. These results are discussed briefly in terms of the complementary structure of the catalytic surface. (Author)

Descriptors: (*Newcastle disease virus, Ultraviolet radiation), (*Radiation effects, Newcastle disease virus), Chickens, Infectious diseases, Embryonated egg technique, Blood, Bacteriophages.

In experiments planned to study the interference phenomenon in cultures of Newcastle disease virus in defibrinated chicken blood it was found that ultracentrifugal concentrates of the virus, when irradiated by ultraviolet light for at least 15 minutes or inactivated by formalin, slightly increased the infectivity titers of the cultures compared with those of the controls. The same phenomenon occurred in nonincubated mixtures of blood, concentrate and virus and, although not regularly, in mixtures containing chicken plasma instead of blood. Mixtures of physiological saline, concentrate and virus did not show the booster effect. The presence of small residues of active virus in irradiated concentrates did not alter the results. (Author)

PB-160 214 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF A CHELATING AGENT ON MYOSIN ATPASE.
Research rept., vol. 12, p. 1-8,
by Eugenia Tarver Friess. 6 Jan 54, 12p
Proj. NM000 018 04 12

Unclassified report

Descriptors: (*Enzymes, Reaction kinetics), (*Ethylenediamine, Muscle proteins), Adenosine phosphates, Calcium, Ions, Inhibition.

The effect of ethylenediamine tetra-acetic acid (EDTA) on the rate of adenosine triphosphate (ATP) dephosphorylation by rabbit myosin has been studied. In the absence of Ca(++), EDTA begins to accelerate the dephosphorylation rate at about .0001 M and achieves a maximum acceleration of approximately 400 percent at about .01 M. In the presence of .001 M Ca(++), EDTA achieves the same maximum acceleration, but does not begin to accelerate the rate until the concentration of EDTA exceeds that of Ca(++). Myosin, to which EDTA has been added and then removed by dialysis, responds to a second addition of EDTA with accelerated ATPase activity, but does not respond to additions of Ca(++). (Author)

PB-160 216 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ADRENALECTOMY ON RADIATION INDUCED MORTALITY OF THE MOUSE,
by E. P. Cronkite and W. H. Chapman. 27 Jun 50, 14p
Proj. NM006 012 04 30

Unclassified report

Descriptors: (*Adrenal glands, Radiation effects), (*Lethal dosage, Adrenal glands), Surgery, Survival, Infection, Hemorrhage, Tissues (Biology).

The adrenalectomized or 'adrenal insufficient' mouse is more sensitive to irradiation than the normal mouse. The survival time of adrenalectomized mice is shortened. The cause of death in the adrenalectomized irradiated mouse is apparently due to mechanisms other than infection and hemorrhage. (Author)

PB-160 219 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ANTIBIOTICS AND METABOLITES ON THE IMMUNITY OF MOSQUITOES TO MALARIAL INFECTION.
Research rept.
by Levon A. Terzian, N. Stahler, and P. A. Ward.
14 Aug 51, 34p
Proj. NM005 048 06 03

Unclassified report

Descriptors: (*Antibiotics, Hemosporida), (*Hemosporida, Immunity), (*Anopheles, Immunity), Plasmodium, Aedes, Parasitic diseases, Infection, Sulfadiazine, Vitamin B complex, Chlortetracycline, Streptomycins, Folic acid, Drugs, Dosage, Tolerances (Physiology), Antimalarials.

It was demonstrated quantitatively that specific biochemical compounds can influence the innate immunity of a host to a parasite. In A. aegypti sulfadiazine, para-aminobenzoic acid, aureomycin, and streptomycin, administered in critical concentrations, increase host susceptibility to infection with P. gallinaceum, whereas folic acid increases host resistance to infection with this parasite. In addition, it has been shown that in A. quadrimaculatus, again para-aminobenzoic acid increases host susceptibility to P. gallinaceum and folic acid increases host resistance to this parasite, but that sulfadiazine and aureomycin, on the other hand, reverse their effects and both increase host resistance to infection. In A. aegypti, the maximum effects of sulfadiazine, para-aminobenzoic acid, folic acid, aureomycin, and streptomycin on the host-parasite equilibrium depend upon a specific optimal range of drug concentrations above which the specific effects of these compounds on susceptibility or resistance are depressed or eliminated. In A. quadrimaculatus, only para-aminobenzoic acid continues to show this concentration-action relation, whereas sulfadiazine, aureomycin, and folic acid produce their maximum effects at maximum tolerated doses.

PB-160 220 Div. 16
OTS Prices: HC $3.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF ANTIMALARIAL DRUGS ON THE EXOERYTHROCYTIC AND ERYTHROCYTIC STAGES OF BLOOD-INDUCED INFECTIONS OF PLASMODIUM FALLAX IN THE TURKEY.
Research rept., vol. 14, p. 657-690,
by Richard N. Rossan. 6 Sep 56, 52p
Proj. NM005 048 01 11

Unclassified report

Descriptors: (*Antimalarials, Plasmodium), (*Plasmodium, Chemotherapy), Toxicity, Drugs, Dosage, Parasitic diseases, Hemosporidia, Erythrocytes, Tissues (Biology), Quinolines, Sulfadiazine, Infections, Turkeys.

The parasite-host combination of Plasmodium fallax in the turkey was used, for the first time, for the testing of some standard antimalarial drugs at two dosage levels. No drug at the low dosage level was effective against the parasitemia. Sulfadiazine significantly reduced the peak parasitemia, but the dosage used was near the toxic level for turkeys. All drugs at the higher dosage level suppressed the parasitemia for varying lengths of time. Pentaquine and isopentaquine has the greatest suppressive power. A consistently reproducible parasitemia occurred by inoculation of the erythrocytic stages of P. fallax into the turkey. Exoerythrocytic stages were found in the tissues of the controls about 13 days after inoculation of the blood forms with the subsequent death of the host. This time lag appeared to be a constant factor in the formation of the exoerythrocytic stages. Three drugs during routine testing, namely pentaquine, isopentaquine and pamaquine (all 8-aminoquinolines), appeared able to prevent or delay the formation of the exoerythrocytic stages. More intensive drug treatment with sulfadiazine and pyrimethamine showed that the latter was more effective in preventing the exoerythrocytic stages from forming. To cure the turkey of a blood-induced P. fallax infection, the exoerythrocytic stages must be killed or be prevented from forming inasmuch as

Research rept., vol. 11, p. 615-630,
by Jean Botts and Manuel Morales. 1 May 53, 16p
Proj. NM000 018 04 09

Unclassified report

Descriptors: (*Enzymes, Reaction kinetics), Catalysts, Inhibition, Chemical bonds, Stability, Hydrolysis, Equations.

An illustrative analytical treatment is given for catalyzed steady state reaction rates in which the ordinary Michaelis-Menten treatment (or its equivalent) is complicated by the presence of rate-modifying substances or by the fact that the enzyme (or other catalyst) has more than one catalytic site. (Author)

PB-160 200 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
APPROXIMATE TREATMENT OF DIFFUSION INTO A CYLINDRICAL ENZYME SYSTEM OBEYING MICHAELIS-MENTEN KINETICS.
Research rept., vol. 13, p. 679-690,
by Jacob J. Blum. 17 Oct 55, 16p
Proj. NM000 018 04 13

Unclassified report

Descriptors: (*Enzymes, Reaction kinetics), Muscles, Muscle proteins, Adenosine phosphates, Stability, Equations.

At very high concentrations (C) of substrate the steady state reaction rate for an enzyme obeying Michaelis-Menten kinetics approaches a maximum, k2E0, independent of C, while at low C the rate becomes proportional to C. Exact solutions for diffusion into a cylindrical cell containing a uniformly distributed Michaelis-Menten enzyme are obtained for both of these extreme cases. In addition one approximate solution has been found to the general non-linear equation, and procedures for obtaining the kinetic constants and diffusion parameters from experimental data are presented. (Author)

PB-160 201 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
ATTEMPTS TO ESTABLISH THE VIRUS OF MEASLES IN LABORATORY ANIMALS BY MOSQUITO PASSAGE.
Rept. no. 2,
by Herbert S. Hurlbut. 30 Jun 48, 8p
Proj. NM005 007

Unclassified report

Descriptors: (*Measles viruses, Aedes), (*Culex, Measles viruses), Laboratory animals, Blood, Larvae, Adults, Bites and stings, Injection (Medicine).

In order to test the possibility that mosquito passage might be effective in adapting certain viruses to laboratory animals which are ordinarily refractory, three species of mosquito, Aedes aegypti L., Aedes triseriatus Say, and Culex pipiens L., were fed mouth and throat washings, and blood from patients in the pre-eruptive stages of measles. This material which was assumed to contain the virus was given to mosquitoes in both the larval and adult stages, and after extrinsic incubation periods of 7 to 20 days at 30C. and 6 to 27 days at 37C., the mosquitoes were permitted to bite mice, and in a few tests, rabbits and guinea pigs. Emulsions of the mosquitoes were also inoculated intracerebrally and intraperitoneally to mice. The results indicate that mosquito passage is not effective as a means of adapting the virus of measles to mice, rabbits or guinea pigs. There was no indication that the virus survived or multiplied in the three species of mosquito used. However, this was not tested with animals of known susceptibility. (Author)

PB-160 203 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AUTOMATIC COMPUTATION OF NERVE EXCITATION.
Research rept., vol. 13, p. 491-508,
by K. S. Cole, H. A. Antosiewicz, and P. Rabinowitz.
12 Aug 55, 20p
Proj. NM000 018 03 03

Unclassified report

Descriptors: (*Nerve impulses, Ionic current), (*Cephalopoda, Nerve impulses), Computers, Differential equations, Nerve fibers, Membranes (Biology), Stimulation, Electrolytes (Physiology), Biophysics.

The National Bureau of Standards computer SEAC efficiently produced numerical solutions for the potentials and ion movements of squid giant axon membrane according to the Hodgkin-Huxley differential equations. The SEAC calculations gave a more than adequately critical threshold for an 'all-or-none' response to a current stimulus. The threshold region had the topological characteristics of a saddle singular point at about -8.33 mv. from the resting potential. Several threshold relations between the stimulus current strength, wave form and duration for single and multiple responses showed the excitation and accomodation typical of many excitable tissues. The highly satisfactory threshold performance of the equations considerably increases the confidence with which they may be used both to calculate the fast ion movements across axon membranes and to guide investigations of the processes by which these movements are controlled. (Author)

PB-160 206 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE BEHAVIOR OF FREE-WEIGHTED ACTOMYOSIN THREADS UNDER PRESSURE,
by Jean Botts, Frank H. Johnson, and Manuel F. Morales.
23 Jun 50, 12p
Proj. NM000 018 04 04

Unclassified report

Descriptors: (*Muscle proteins, Pressure), Volume, Time, Thermodynamics, Equations, Energy, Storage, Phosphates, Solutions.

Length was measured as a function of time and pressure, for free-weighted actomyosin threads immersed in a .001 M phosphate buffer solution. From these measurements upper limits were calculated for the numerical value of the pressure-volume term in the thermodynamic equation for the tension. It was found that this term was negligible compared to other terms of the equation and therefore that the ordinary method of obtaining the internal energy contribution to the tension is valid. At pressures above some 1000 lb per square in, the free-weighted threads lengthen irreversibly, and the lengthening stops when the pressure is removed. This is interpreted as another manifestation of the Marsland-Brown (viscosity) effect, and as being probably due to reduction in cross-linking of the gel. (Author)

PB-160 211 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A BOOSTER EFFECT OF IRRADIATED OR FORMOLIZED NEWCASTLE DISEASE VIRUS UPON THE INFECTIVITY OF ACTIVE VIRUS IN THE PRESENCE OF CHICKEN BLOOD.
Research rept., vol. 12, p. 119-128,
by Erich Traub. 23 Apr 54, 1 p
Proj. NM005 048 11 06

Unclassified report

AND CECUM-COLON.
Research rept., vol. 11, p. 99-108,
by Robert A. Conard. 19 Jan 53, 14p
Proj. NM006 012 04 58
AD 12 325

Unclassified report

Descriptors: (*Radiation effects, Gastrointestinal system), (*Gastrointestinal system, Radiation effects), Whole body irradiation, Body weight, Stomach, Intestines, Rats.

The effect of 500 r whole body irradiation on organ weights and weights of the contents of the stomach, small intestine and cecum-colon of the rat was studied. All three components showed loss of weight during the first three to four day post-irradiation period which was greater than body weight loss. The stomach, small intestine and cecum-colon showed percentage weight losses of 15.7, 34.4 and 23.6, respectively. Organ weights, except for the stomach, returned nearly to normal on the fourth and fifth day. The significantly greater weight loss in the small intestine was believed to reflect greater sensitivity of this part to ionizing radiation. It was pointed out that these weight changes were not due to dehydration or edema of the tissues or to the lowered food intake alone, but were in a large part due to specific effects of radiation. The stomach showed the greatest variation in contents after irradiation, with a marked increase occurring during the first 72 hours which was believed to be associated with delayed emptying of the stomach. During this same period the small intestine and cecum-colon showed slightly reduced contents which became liquid and foul-smelling in character. From the third to fourth days through the seventh day there was a marked increase in contents in all parts above the control range with a change to the normal semi-solid state. It was believed that this change was the reflection of compensatory increased food consumption associated with improved gastro-intestinal function. (Author)

PB-160 237 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECTS OF AGING AND THE MODIFICATIONS OF THESE EFFECTS, ON THE IMMUNITY OF MOSQUITOES TO MALARIAL INFECTION.
Research rept., vol. 13, p. 879-888,
by Levon A. Terzian, N. Stahler, and F. Irreverre.
12 Dec 55, 14p
Proj. NM005 048 06 08A

Unclassified report

Descriptors: (*Aging (Physiology), Immunity), (*Aedes, Hemosporidia), (*Plasmodium, Immunity), Infections, Adults, Parasitic diseases, Blood plasma, Blood cells, Hemoglobin, Nitrogen, Tissues (Biology), Hemolysis.

In further studies designed to gain additional insight into the mechanisms that determine innate or natural immunity, it has been shown that the older the mosquito Aedes aegypti grows the more resistant it becomes to infection with the malarial parasite Plasmodium gallinaceum. Consequently, the levels of parasitism in groups of aging mosquitoes 2 to 4 weeks old, were progressively and significantly lower than in young, control groups. In addition, it has been shown that aging mosquitoes given a normal blood meal prior to the infective feed became again as susceptible as newly emerged adults. On the other hand, aging mosquitoes fed on solutions of chick or human plasma, hemoglobin, lysed red cells, or plasma and lysed red cells combined, developed an over greater degree of resistance to infection than that which results as consequence of advanced age. These facts, and the fact that changes in tissue nitrogen levels of aging mosquitoes bore no demonstrable relation changes in the innate immunity of such mosquitoes, suggest that host immunity to infection depends upon specific physiological factors which function apparently in low concentration, rather than upon gross quantitative changes in the nitrogen levels of the host animal. Finally, from the observed differences in effect on host immunity between whole blood and separated blood elements it appears not unreasonable to assume that there is present some labile component in whole blood, most probably associated with intact cells, which undergoes considerable qualitative change when cells are lysed or the blood elements are mechanically separated. (Author)

PB-160 238 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECTS OF ALTERED ACID-BASE BALANCE ON ADRENOCORTICAL FUNCTION IN ANESTHETIZED DOGS.
Research rept., vol. 14, p. 609-618,
by John B. Richards. 27 Aug 56, 16p
Proj. NM007 081 22 14

Unclassified report

Descriptors: (*Acid-base equilibrium, Adrenal cortex), (*Adrenal cortex, Acid-base equilibrium), Hydrochloric acid, Sodium compounds, Carbonates, pH, Carbon dioxide, Pituitary gland, Stimulation, Anesthesia, Parenteral infusions, Dogs.

The effects of altered acid-base balance, induced by the intravenous infusion of either hydrochloric acid or sodium bicarbonate, on adrenocortical function in anesthetized dogs was studied. The secretory activity of the adrenal cortex was determined by measuring 17-hydroxycorticosteroids in adrenal venous blood. Adrenocortical stimulation occurred in dogs with a profound decrease in arterial pH and bicarbonate concentration in the presence of a normal arterial CO_2 tension (acid infusions) and in dogs with increased arterial CO_2 tension and bicarbonate concentration in the presence of a normal arterial pH (bicarbonate infusions). It is concluded that concomitant alterations in both arterial pH and CO_2 tension are not required to initiate an adrenocortical response, and it is suggested that a suitable change in either of these factors may act as a pituitary-adrenocortical stimulus. (Author)

PB-160 241 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECTS OF INTRA-ARTERIAL ADMINISTRATION OF NITROGEN NUSTARD.
Research rept.,
by J. R. Barberio, C. T. Klopp, W. W. Ayres, and H. A. Gross. 10 Sep 51, 50p
Proj. NM000 018 08 01

Unclassified report

Descriptors: (*Cancer, Nitrogen mustards), (*Nitrogen mustards, Pathology), Dosage, Injection (Medicine), Survival, Blood vessels, Neoplasms, Hematology, Tissues (Biology), Cannulation, Dogs, Humans.

A method for regional intra-arterial treatment of pelvic structures of dog and man is described. The survival time of dogs given intra-arterial HN2 was inversely proportional to the size of the daily dose administered. The survival time of dogs given divided doses of intra-arterial HN2 was increased over dogs given the same amount in a single daily injection. Ligation of the inferior vena cava resulted in increased survival time in dogs given intra-arterial HN2. The pathological changes after intra-arterial HN2 are described. The pathological changes after intra-arterial HN2 were similar to those of irradiation, but the action of HN2 appeared to

they not only constitute a reservoir of reinfection for the erythrocytes but will eventually kill the host. (Author)

PB-160 224 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECT OF CELL-FREE AQUEOUS EXTRACTS FROM NORMAL AND IRRADIATED SPLEENS ON X-RAY INDUCED MORTALITY IN MICE.
Research rept., vol. 12, p. 25-40,
by Friedrich Ellinger. 10 Feb 54, 12p
Proj. NM006 012 04 63
AD 36 251 Unclassified report

Descriptors: (*Spleen, Radiation effects), (*Radiation effects, Tissue extracts), (*Leukemia, Radiation effects), Whole body irradiation, X-rays, Lethal dosage, Pharmacology, Hemopoietic system, Adrenal cortex, Radiobiology, Radiochemistry, Radiation damage, Blood diseases, Mice.

Preparation of cell-free aqueous extract from normal and irradiated spleens of mice is described. Injections of these extracts into mice in the amount of 0.3 cc. daily for 6 days starting on the day of irradiation were performed. Exposures of mice of X-rays took place as total-body irradiation with doses corresponding to the LD 80, 55, and 30/14 days respectively. The influence of these spleen extracts on the mortality rates was observed for 28 days. It was noted that extracts made from normal spleens enhanced the X-ray induced mortality for the first 2 weeks at all 3 dose levels, while the spleen extracts from mice exposed to the LD 30 resulted in a statistically significant reduction of mortality of this X-ray dose manifested after the 14th day after irradiation. Similar extracts made from spleens obtained from mice exposed to LD 55 and injected into mice exposed to the same X-ray dose failed to show this reductive effect. The significance of these findings for normal and abnormal leukopoiesis and the effects of ionizing radiation thereupon is discussed and presented diagramatically. (Author)

PB-160 232 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECT OF SNAIL MAINTENANCE TEMPERATURES ON DEVELOPMENT OF SCHISTOSOMA MANSONI.
Research rept., vol. 12, p. 349-360,
by Margaret Stirewalt Lincicome. 17 Aug 54, 13p
Proj. NM005 048 02 31
Unclassified report

Descriptors: (*Schistosoma, Life cycle), Temperature, Gastropoda, Mollusca, Infections, Larvae, Trematodes, Mice.

Certain phases of the relationships between Puerto Rican Schistosoma mansoni and its snail and mouse hosts have been shown to be influenced markedly by the temperatures at which the exposed molluscs are maintained. Maintenance temperatures of 23 to 25C., 26 to 28C., 31 to 33C., 33 to 35C., and 36 to 38C. were used. In the snail, the rate of infections maturing, and possibly the daily cercarial emergence as well, was reduced, the prepatent period lengthened, and the patent period shortened as maintenance temperatures were lowered. Many infected snails cultured at 23 to 25C. lost their infections entirely after several months. Furthermore, the cercariae which developed from sporocysts at this temperature were low in their infectivity for mice. (Author)

PB-160 233 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF SUBCUTAENEOUS AND INTRAVENOUS INJECTIONS OF ADRENAL CORTICAL EXTRACT ON THE PERIPHERAL LEUKOCYTE POPULATION AND BODY TEMPERATURE OF RABBITS.
Rept. no. 3,
by Richard S. Farr, Virgil S. Lequire, Paul K. Schork, and Charles H. Gayhart. 30 Jul 48, 15p
Proj. NM007 039
Unclassified report

Descriptors: (*Adrenal cortex, Leukocytes), (*Leukocytes, Blood diseases), (*Tissue extracts, Lymphocytes), Body temperature, Blood counts, Blood cells, Eosinophils, Injection (Medicine), Temperature, Rabbits.

The effect of single subcutaneous and intervenous injections of aqueous adrenal cortical extract (ACE) on the leukocyte population and body temperature of 23 rabbits was studied. When ACE was given subcutaneously at either 15C. or 37C., it induced a greater depression of the mononuclear leukocyte count than did control solutions. In general, the mononuclear leukopenia following the subcutaneous injection of ACE, as described by Dougherty and White was confirmed. However, the marked changes in mononuclear leukocytes found to occur in the control animals minimized the significance of the magnitude of the changes following the subcutaneous administration of ACE. When given intravenously, the mononuclear leukocyte response to ACE appeared to be dependent upon the temperature of the solution when injected. At 37C. .The ACE failed to reduce the mononuclear leukocyte count as much as did the control solutions. At 15C. the ACE depressed the mononuclear leukocyte count more than did the control solutions. A heterophile leukocytosis followed the injection of ACE in all of the intravenous and subcutaneous studies. The temperature, and the basophile and eosinophile counts apparently were not affected by the amounts of ACE given. (Author)

PB-160 235 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECT OF X-IRRADIATION ON THE IMMUNITY OF MOSQUITOES TO MALARIAL INFECTION.
Research rept., vol. 11, p. 683-692,
by Levon A. Terzian. 26 May 53, 14p
Proj. NM005 048 10 01.
AD 36 190 Unclassified report

Descriptors: (*Aedes, Radiation effects), (*Radiation effects, Immunity), (*Plasmodium, Immunity), Parasitic diseases, Hemosporidia, X-rays, Survival, Dosage, Penicillins, Sulfadiazine, Infections.

It has been shown that the mosquito Aedes aegypti, in common with other insects, is extremely resistant to exposure to X-irradiation and may survive doses as high as 40,000 r for as long as 12 days following exposure. However, even though X-irradiation in sufficient dosage produces markedly deleterious effects on the mosquito, it does, nevertheless, produce a significant increase in resistance to infection by the malarial parasite Plasmodium gallinaceum. Thus, from a 2.7 fold decrease in the level of parasitism of mosquitoes receiving a dose of 5,000 r, the degree of resistance increased with increasing dosages of X-irradiation until there was a maximum 6.6 fold decrease in the level of parasitism of the mosquitoes exposed to 30,000 r as compared to the normal control animals. Finally, it has been shown that penicillin, and sufadiazine, when administered to X-irradiated mosquitoes in adequate concentrations prior to infection, are capable of reversing the effects on host immunity produced by exposure to X-irradiation and reestablishing what would appear to be a normal host-parasite relation. (Author)

PB-160 236 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECT OF X-IRRADIATION ON WEIGHT AND CONTENTS OF THE RAT STOMACH, SMALL INTESTINE

Descriptors: (*Crustacea, Growth), (*Larvae, Crustacea), Embryos, Eggs, Algae, Inhibition, Food, Diet, Morphology (Biology)

Neopanope texana sayi, Hexapanopeus angustifrons, and Piluminus sayi have been reared in isolation from eggs through the first crab stage with about 80% survival. These species hatched in the laboratory as first zoeae and underwent three more zoeal stages and one megalopal stage before metamorphosis to the first crab stage. The duration of the larval stages was twice as long when the zoeae were fed Artemia nauplii plus algae, as when fed Artemia alone. Larvae did not survive when fed algae alone but lived longer than those not fed at all. The mechanism of this inhibition of development by algae is unknown. A morphological description of the larvae of Neopanope texana sayi is given. While no variation in the number of larval stages was found, variations in the zoeae at each stage are described. Some of these variable characters are those frequently used in comparative work on zoeae. (Author)

PB-166 083 Div. 16, 6, 8
OTS Prices: HC $5.00/MF $1.00

Bionic Instruments, Inc., Bala-Cynwyd, Pa.
THE MODEL G-5 OBSTACLE DETECTOR.
Rept. for July 1961-Jun 63.
Dec 63, 181p
Contract V1005P 9217 Unclassified report

Descriptors: (*Prosthetics, Detectors), (*Detectors, Prosthetics), (*Blindness, Prosthetics), Optical equipment, Lenses, Light pulses, Lighting equipment, Photoelectric cells (Semiconductor), Scanning, Circuits, Wiring diagrams, Amplifiers, Noise, Tests, Design, Manufacturing methods.

The report covers the design and the manufacture of the G-5 model of the Veterans Administration Obstacle Detector for use of the blind. (Author)

PB-166 172 Div. 16
OTS Prices: HC $1.00/MF $0.50

Massachusetts General Hospital, Boston.
ALTERATIONS OF CENTRAL NERVOUS SYSTEM FUNCTION BY FOCUSED ULTRASOUND.
Progress rept.,
by H. T. Ballantine, Jr., and E. Bell. 16 Apr 57, 22p
Contract AF18 603 13
AFOSR TN57 261; AD 132 352
Unclassified report

Descriptors: (*Central nervous system, Ultrasonic radiation), (*Radiation damage, Central nervous system), Radiological dosage, Nerve fibers, Nerve impulses, Nervous system, Physiology, Vision, Brain, Radiation effects, Spinal cord, Surgical techniques, Electroencephalography, Cats.

It has been reported that the lateral geniculate body is more refractory to the damaging effect of ultrasound than structures which immediately surround it. Recent experiments have shown, however, that with lenses of larger numerical aperture and with doses of high intensity and short duration it is possible to place lesions consistently in the fiber tracts immediately superior or inferior to the lateral geniculate body as well as in the superior or inferior third of the lateral geniculate body itself. The effects of such lesions on functional activity of the visual cortex of cats are being studied currently.

PB-166 216 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECTS OF EMBALMING ON THE COMPRESSIVE STRENGTH OF A FEW SPECIMENS OF COMPACT HUMAN BONE,
by Paul Calabrisi and Frank C. Smith. 26 Feb 51, 12p
Proj. NM000 018 07 02
NMRI MR51 2
Unclassified report

Prepared in cooperation with National Bureau of Standards, Washington, D. C.

Descriptors: (*Bone, Compressive properties), Legs, Preservation, Alcohols, Formaldehyde, Amputation stumps, Pathology.

Compressive tests were made on seven pairs of specimens, each machined from the middle third of each of seven human femurs and tibias. One specimen in each pair was tested shortly after dissection of the bones and the remaining seven specimens were tested after embalming in equal volumes of 95 per cent alcohol, 10 per cent formalin and chemically pure glycerine for a period of about seven weeks. The tests showed that such embalming reduced the compressive strength of the bone about 13 per cent. The results of compressive tests made on seven very small cylindrical specimens machined from the cortex of the middle third of the shaft of a human tibia indicated that such small specimens might be useful in the determination of bone strength. These tests are described in the appendix to this report. (Author)

PB-166 217 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
INJURY TO LIVING CELLS IN STANDING SOUND WAVES.
Research rept.,
by D. E. Goldman and W. W. Lepeschkin. 10 Dec 51, 24p
Proj. NM004 005 03 05
Unclassified report

Descriptors: (*Cells (Biology), Ultrasonic radiation), (*Ultrasonic radiation, Cells (Biology)), Sound, Standing wave ratios, Viability, Tissues (Biology), Erythrocytes, Yeasts, Algoe, Shock waves, Cavitation.

Cells of Spirogyra, Elodea, yeast and red blood cells have been exposed to different parts of a standing wave sound field at frequencies of 400, 700 and 1000 kilocycles in an aqueous medium. Experiments have been carried out in gassy water, degassed water, and in agar gel as well as under reduced and increased hydrostatic pressure. Heating of the cells by sound absorption in the medium was avoided. The results showed rapid injury when cavitation was present. If cavitation was prevented injury occurred slowly and only at pressure nodes. Possible mechanisms for mechanical injury are discussed. (Author)

PB-166 223 Div. 16, 12, 30, 31
OTS Prices: HC $7.00/MF $2.25

Lockheed Missiles and Space Co., Palo Alto, Calif.
A SYMPOSIUM ON TOXICITY IN THE CLOSED ECOLOGICAL SYSTEM,
ed. by M. Honma and H. J. Crosby. 1963, 372p
Unclassified report

A compilation of papers presented July 29, 30, and 31, 1963, Palo Alto, Calif. under the co-sponsorship of the U. S. Navy Special Projects Office and Lockheed Missiles and Space Co.

Descriptors: (*Symposia, Closed ecological systems), (*Closed ecological systems, Toxicity), Biological contamination, Nuclear powered vessels, Submarines, Space environmental conditions, Toxic tolerance,

be more rapid and less sustained than that of irradiation. The cause of death in most of the dogs after intra-arterial administration of HN2 could not be explained. In a few of the dogs, death was attributed to septicemia with numerous embolic bacterial abscesses. The cause of death in the HN2 dogs could not be determined, but was not associated with a hemorrhagic diathesis. The pathological changes in adenocarcinoma of the rectum after intra-arterial HN2 were similar to those occurring in the rectum of dogs given HN2 intra-arterially. Intra-arterial HN2 resulted in regression but not eradication of adenocarcinoma of the rectum in each of two patients. (Author)

PB-160 242 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
EFFECTS OF IONIZING RADIATION ON ORAL STRUCTURES. I. PILOT STUDIES ON DENTAL CARIES IN THE WHITE RAT.
Research rept.
by C. A. Schlack and Friedrich Ellinger. 19 Mar 51, 10p
Proj. NM006 012 04 35

Unclassified report

Descriptors: (*Radiation effects, Teeth), (*Teeth, Radiation effects), Mouth, Diseases, Diet, Whole body irradiation, Body weight, X-rays, Rats.

A pilot study involving carious susceptible rats of the Naval Medical Research Institute strain kept on a cariogenic and Purina Laboratory Chow dietary regimen and exposed at the age of three weeks to 200 r of X-ray (HVL - 0.75 mm. Cu.) given as total body radiation in single exposure is reported. The following results were obtained: (a) In the group of irradiated animals kept on the cariogenic dietary regimen, a statistically significant increase of dental caries incidence was found as compared with the unirradiated controls. (b) In the group of irradiated animals kept on Purina Laboratory Chow no such results were obtained. (c) The analysis of the weight curves indicated a lesser gain of body weight of the irradiated animals irrespective of the dietary regimen. (Author)

PB-160 243 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE EFFECTS OF LARVAL POPULATION DENSITY ON SOME LABORATORY CHARACTERISTICS OF ANOPHELES QUADRIMACULATUS, SAY.
Rept. no. 1,
by Levon A. Terzian and Nathan Stahler. 10 Dec 48, 23p
Proj. NM005 019

Unclassified report

Descriptors: (*Anopheles, Population), (*Stress (Physiology), Anopheles), Larvae, Adults, Body weight Bites and stings, Behavior, Blood, Males, Females, Disease vectors, Morphology (Biology), Viability, Reproduction (Physiology).

Population stresses during the larval development of Anopheles quadrimaculatus produce characteristic effects on the resulting pupae and adults. Thus, pupae from underpopulated colonies are more uniform, heavier and more viable than pupae from overpopulated colonies, while the adults usually have a higher biting rate and are consistantly more constant in their reactions to a blood meal than the adults from overpopulated colonies. The study indicates further that the biting rate of adults from overcrowded colonies is related to the rate of pupation, the peak of biting coinciding with the peak of pupation, and that pupal and adult mortality is increased as the larval developmental period is lengthened. Finally, if has been shown that the ratio of males to females within a given adult population is a factor in determining the biting rate of the females, the biting rate increasing as the ratio of males to females is increased. (Author)

PB-160 245 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
AN EFFICIENT METHOD FOR EXPOSURE OF MICE TO CERCARIAE OF SCHISTOSOMA MANSONI.
Research rept.
by Louis Oliver and M. A. Stirewalt. 15 Aug 51, 12p
Proj. NM005 048 02 26

Unclassified report

Descriptors: (*Schistosoma, Infections), (*Mice, Schistosoma), Larvae, Trematodes, Worms, Exposure.

A method of exposing mice to the cercariae of Schistosoma mansoni has been developed which eliminates some of the undesirable features of other procedures, produces generally heavier infections, and permits collection of data not available when other exposure techniques are used. (Author)

PB-160 246 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
THE ELASTIC MECHANISM AND HYDROGEN BONDING IN ACTOMYOSIN THREADS,
by Jean Botts and Manuel Morales. 23 Jun 50, 44p
Proj. NM000 018 04 01

Unclassified report

Descriptors: (*Muscle proteins, Elasticity), (*Chemical bonds, Muscle proteins), Electron microscopy, Hydrogen, Electrostatics, Muscles, Thermal properties, Peptides, Infrared spectroscopy.

Electron microscope studies of mixtures of actomyosin and substances capable of H-bonding to various extents, showed that the ability of a substance to H-bond roughly paralleled its ability to reduce the cross-linked character of an actomyosin gel. Likewise, H-bonding ability ran parallel to the ability to dissolve actomyosin threads. It was inferred that the H-bond, along with electrostatic links, plays an important role in cross-bonding actomyosin. Tension as a function of temperature was measured at various extensions for two types of actomyosin threads: threads which had never been allowed to dry (native), and threads which had been dried under stretch (vulcanized presumably by H-bonding). Analysis showed that in native threads the positive tension was entirely entropic, and the enthalpy made a negative contribution, best explained as due to the repulsion of charges of like sign fixed along the linear elements. In vulcanized threads the positive tension was all enthalpic, and the entropy made a negative contribution, attributable to a semi-crystallinity in the vulcanized state.

PB-162 100 Div. 16
OTS Prices: HC $3.00/MF $0.75

Chesapeake Bay Inst., Johns Hopkins Univ., Annapolis, Md.
STUDIES ON THE LARVAL DEVELOPMENT OF NEOPANOPE TEXANA SAYI (SMITH) AND OTHER CRABS OF THE FAMILY XANTHIDAE (BRACHYURA),
by N. A. Chamberlain. Jan 61, 84p CBI-TR-22, CBI-Ref-61-1
Contract Nonr248 46, Proj. NR104 317
AD 253 978

Unclassified report

tering of pions on protons are presented and analyzed. The processes studied were positive pion-proton scattering at 2.92 GeV/c, and negative pion-proton scattering at 3.15, 4.13, and 4.95 GeV/c. The data are fit to an exponential function of the four-momentum transfer, t, in several different ways in attempts to explore systematic energy and angular dependences. The results are compared with proton-proton scattering data over the same energy range and substantial differences between the two processes are evident. (Author)

PB-160 141 Div. 20, 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
OUTPUT CHARACTERISTICS OF A COMMERCIAL X-RAY GENERATOR AT 2000 K. V. P.,
by F. W. Chambers, Jr., J. E. Morgan, and J. T. Istock. 7 Dec 49, 30p
Proj. NM006 012 08 26

Unclassified report

Descriptors: (*X-ray tubes, Performance (Engineering)), (*Gamma emission, Medical equipment), X-rays, Beams (Electromagnetic), Intensity, Geometric forms, Absorption, Penetration, Dose rate, Radiobiology.

A quantitative survey of X-ray emission patterns from a commercial 2000 K.V.P. generator is presented, with particular attention toward applicability in medical research. The following characteristics are individually evaluated: Transmitted beam.-Adequately filtered through tungsten and copper of anode; limited by lead shutters to approximately 17 degrees, useful solid angle. Half value layer of 7.45 mm. Pb corresponds to 0.83 mev. gamma radiation. Maximum central intensity of 36.3 r/minute in air at 200 cm. F.S.D. falls to 31.0 r/minute on periphery of 60 cm. diameter field. Uniformly irradiated area has proved too restricted for large scale experiments. Radial beam.- Relatively low inherent filtration; ample exposure area available due to 360 degrees circular symmetry. Half value layer of 4.3 mm. Pb corresponds to 0.53 mev. gamma equivalent. A cylindrical field of 200 cm. radius, concentric with the vertical tube axis, shows maximum intensity of approximately 16 r/minute in air between elevations 30 cm. and 40 cm. above anode level. Extreme variation is ± 8.5% of mean value between 10 cm. and 70 cm. and progressively decreases to ± 1.6% between 24 cm. and 51 cm. Uniformity of background scatter within working area permits a simple correction constant for accurate inverse square extrapolation from the intensity/distance curve. Tissue equivalent dose measurements show 115% free air intensity at incident surface of a 36 cm. cubical masonite phantom; 100% at 6.6 cm. depth, and 50% at 17.5 cm. depth. (Author)

PB-160 176 Div. 20, 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A DIRECT READING RATE METER FOR HIGH INTENSITY PENETRATING RADIATION.
Research rept., vol. 10, p. 483-500,
by J. E. Morgan, F. W. Chambers, Jr., D. T. O'Connor, and J. T. Istock. 27 Oct 52, 28p
Proj. NM006 012 04 57

Unclassified report

Descriptors: (*Dosimeters, X-rays), (*Gamma emission, Medical equipment), (*Radiological dosage, Radiation measurement systems), Health physics instrumentation, Circuits, Ionization chambers, Galvanometers, Coaxial cables, Calibration, Electrometers, Radiobiology.

Inherent technical difficulties in the measurement of X-ray intensities from 100 to 5,000 r/minute, at exciting potentials between 400 and 2,000 K.V.P., have been investigated. Extending the ranges of conventional condenser-electrometer dose meters by use of absorbing media not only increases energy dependence, but is also found to cause an apparent displacement in effective geometrical location of the ionization chamber. 250 r, 1,000 r and 2,500 r condenser chambers have proved susceptible to serious errors from dielectric leakage, which increase rapidly with chamber range above 100 r and with radiation energy above 200 K.V.P. Associated measurements of voltage saturation indicate that no error from this source need be expected for full scale exposure times exceeding two seconds. A direct reading circuit has been developed to combine the known wavelength characteristics of 'air wall' thimble type chanbers with the linear current response of a portable d'Arsonval galvanometer. A 25 r Victoreen chamber, remotely read through lengths up to 70 feet of polyethylene coaxial cable, shows linear calibration from 35 to 5,500 r/minute with over-all reproducibility to the order of ± 1.5 per cent. Ionization readings correspond, within the accuracy of chamber volume determination, to the definitive value of e.s.u./cc. second. (Author)

PB-166 111 Div. 20
OTS Prices: HC $5.00/MF $1.00

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
PROCEEDINGS OF THE CONFERENCE ON PHOTON INTERACTIONS IN THE BeV-ENERGY RANGE,
ed. by Bernard T. Feld. 30 Jan 63, 183p

Unclassified report

An international converence, held 26-30 Jan 63, jointly sponsored by the IUPAP, U.S. AEC, NSF, and ONR.

Descriptors: (*Photons, Symposia), Field theory, Quantum mechanics, Nucleons, Nuclear reactions, Elementry particles, Radioactive decay, K mesons, Pions, Protons, Compton scattering, Mesons, Nuclear scattering, Bremsstrahlung, Particle beams, Polarization, Radiation measurement systems, Pair production, Bubble chambers, Electron accelerators.

Indluded are 60 papers and remarks in the following areas: quantum electrodynamics and electromagnetic form factors; Regge poles; photoproduction, experimental; photoproduction, theory; new experimental approaches; new detection methods; experiments in progress at CEA.

22. Ordnance

PB-166 251 Div. 22, 6, 25, 31
OTS Prices: HC $5.00/MF $1.00

Office of Scientific Research and Development. Div. 6.
ACOUSTIC TORPEDOES.
Summary technical rept., vol. 22,
by W. V. Houston and Vernon M. Albers. 1946,
declassified 2 Aug 60, 182p STR-6-22
Contract OEMsr1131, Projs. NO94, NO149
AD 221 612

Unclassified report

Descriptors: (*Acoustic torpedoes, Control systems), (*Torpedoes, Echo ranging), (*Echo ranging, Torpedoes), Homing torpedoes, Homing devices, Acoustics,

Microorganisms, Pharmacology, Thresholds (Physiology), Spacecraft cabins, Manned, Spectroscopy, Carbon dioxide, Oxygen, Space biology, Space medicine, Nutrition, Astronauts, Life support, Control systems, Optical instruments, Laboratory equipment, Laboratory animals, Models (Simulations).

This symposium considered all of the essential concepts involved in toxicity, contamination, and air pollution (atmosphere) in the closed ecological system; although it covered the total contamination problem, it was limited in the sense that it was concerned only with those problems related to the closed system. Furthermore, these concepts and problems are interrelated; they are of concern not only to human beings but also to the non-human elements - equipment, machinery and other material environments. Thus, a broader scope of these fields is covered than might initially be surmised, and the entire spectrum attains vital importance, since in closed ecological systems such knowledge of interrelationships and manifestations is indeed necessary for manned penetrations of outer space.

PB-166 249 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL, AND COMBINED THERMAL AND IONIZING RADIATION, EFFECTS ON BIOLOGICAL SYSTEMS.
Semi-annual progress rept. for 1 Jul-31 Dec 52,
by G. E. Sheline. 31 Jan 53, 28p
USNRDL 385; AFSWP 234

Unclassified report

Descriptors: (*Thermal radiation, Skin), (*Radiation effects, Animals), Burns, Phospholipids, Ear, Temperature, Time, Radiological dosage, Whole body irradiation, Survival, Body weight, Blood counts, Blood analysis, Pathology, Erythrocytes, Liver, Spleen, Kidneys, Blood coagulation, Amino acids, Nitrogen, Biochemistry.

The local action of radiant thermal energy on animal skin was studied. The combined effects of ionizing radiation and thermal injury on animals was also studied to provide a better basis for the evaluation of such combinations of injuries, and to utilize this information in providing means for casualty estimation.

18. Military Sciences and Operations

PB-181 549 Rev. Div. 18
OTS Prices: HC $2.00/MF $0.75

Assistant Secretary of Defense (Installations and Logistics), Washington, D. C.
DEPARTMENT OF DEFENSE GUIDE TO THE EVALUATION OF THE PERFORMANCE OF MAJOR DEVELOPMENT CONTRACTORS,
26 Jul 64, 60p

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Department of Defense, Research program administration), Handbooks, Reports, Costs, Standards, Scheduling, Management engineering.

The purpose of the Defense Program of Contractor Performance Evaluation is to provide an orderly and uniform method of determining and recording the effectiveness of contractors in meeting their contractual commitments under contracts for advanced development, engineering development and operational-systems development. The existence of this procedure will increase the importance to the contractor of satisfying his agreements in regard to cost, schedule and technical performance.

19. Navigation

PB-166 235 Div. 19, 25
OTS Prices: HC $6.00/MF $1.25

Office of Scientific Research and Development Div. 17.
COMPASSES, ODOGRAPHS, COMBAT ACOUSTICS, AND SONIC DECEPTION.
Summary technical rept., vol. 2.
1946, declassified 2 Aug 60, 205p
Contract OEMsr1131
AD 221 603

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy, see also PB-166 232.

Descriptors: (*Compasses, Navigation), (*Combat noise, Acoustics), (*Deception, Sound), Fuzes (Ordnance), Oximeters, Fuel gages, Marine engines, Sound transmission, Attenuation, Deafness, Explosions, Simulation, Loudspeakers, Sound signals.

The volume is divided into two parts. Part I contains six chapters dealing with various general types of instruments for combat use. The instrumentation described in these chapters differs from that in Volume 4 in that the latter volume describes instruments of a laboratory or training nature. The seven chapters comprising Part II of this volume deal with combat acoustics, sonic deception and simulation. Although the subject matter of the individual chapters varies somewhat, the underlying problems, theory, and techniques encountered throughout are similar.

20. Nuclear Physics and Nuclear Chemistry

AD-409 288 Div. 20
OTS Prices: HC $3.00/MF $0.75

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
PION-PROTON ELASTIC SCATTERING FROM 3 GeV/c TO 5 GeV/c.
Technical rept. no. 10,
by M. L. Perl, L. W. Jones, and C. C. Ting. Jun 63, 96p ORA-03106-10-T
Contract Nonr1224 23, Proj. 03106

Unclassified report

Descriptors: (*Pions, Elastic scattering), (*Proton scattering, Pions), Proton cross sections, Potential scattering, Momentum, Radiation measurement systems.

Results of a spark chamber experiment on elastic scat-

PB-166 198 Div. 28
OTS Prices: HC $2.00/MF $0.50

American Psychological Association, Inc., Washington, D. C.
A PRELIMINARY STUDY OF INFORMATION EXCHANGE ACTIVITIES OF FOREIGN PSYCHOLOGISTS AND A COMPARISON OF SUCH ACTIVITIES WITH THOSE OCCURING IN THE UNITED STATES.
Jun 64, 46p APA-PSIEP-10
Grant NSF GN281, continuation of Grant NSF G18494
Unclassified report

Descriptors: (*Psychology, Distribution), (*Scientific personnel, Psychology), United States, Europe, South America, Symposia, Periodicals, Reports, Sampling.

The study was undertaken as a preliminary investigation of possible differences between the dissemination processes associated with information resulting from the work of foreign and United States psychologists. It was hoped that some data upon the sources of information on which foreign psychologists depended, upon the general references and abstracting services which they utilized, and upon the periodicals important to their work could be obtained and a comparison of foreign and United States psychologists with regard to both the dissemination of information and the effective sources of information might be possible.

30. Research and Research Equipment

PB-163 974 Div. 30, 8
OTS Prices: HC $2.00/MF $0.50

Electronics Research Lab., Univ. of California, Berkeley.
ON THE EQUIVALENCE OF DISCRETE SYSTEMS IN TIME-OPTIMAL CONTROL,
by E. Polak. 17 Nov 61, 29p IER-60-417
Grant NSF G15965
Unclassified report

Descriptors: (*Control systems, Optimization), (*Optimization, Control systems), Time, Computers, Modulators, Control, Dynamics, Pulse modulation, Differential equations, Sequences, Functions, Set theory, Transformations (Mathematics), Mapping (Transformations), Convex sets, Game theory, Linear systems, Nonlinear systems.

It is shown in this paper that under a transformation which maps the state space of a system onto a sequence space in a one-to-one manner, time-optimal discrete regulator systems with different dynamics and modulators can be brought to equivalence and that this fact may be used to construct an optimal control strategy for one system from the known optimal control strategy of another one. In particular, the optimal control strategy for a pulse-width-modulated discrete system with a plant described by an nth order linear differential equation is derived in this manner. (Author)

PB-166 103 Div. 30
OTS Prices: HC $3.00/MF $0.75

Lockheed Missile and Space Co., Sunnyvale, Calif.
BIBLIOGRAPHY OF LMSC BIBLIOGRAPHIES.
Rept. for 1958-1963.
Jan 64, 76p LMSC-5-10-64-2, SB-64-7
Unclassified report

Descriptors: (*Bibliographies, Scientific research), Metallurgy, Spacecraft, Radiation effects, Organic chemistry, Guided missiles, Electronics, Computers, Nuclear physics, Electronic equipment, Ionization, Radar, Astrophysics, Plasma physics, Optics, Thermodynamics, Biology, Sound, Structures, Aeronautics, Rockets.

This publication is a listing of all bibliographies generated by the LMSC Technical Information Center during the period 1958 - 1963. Entries are arranged alphanumerically by report coding. Subject and personal author indexes are included.

PB-166 167 Div. 30, 8
OTS Prices: HC $5.00/MF $1.00

RCA Defense Electronic Products, Camden, N. J.
PROJECT LIGHTNING. VOLUME VI: LOGIC, INPUT-OUTPUT, AND INSTRUMENTATION,
Final research rept., vol. 6, phase 1, 1 Jul 57-31 Dec 58. 31 Dec 58, 182p
Contract NObsr72717
AD 227 835
Unclassified report

See also PB-165 036

Descriptors: (*Data processing systems Computers), (*Input-output devices, Circuits), (*Computer logic, Gates (Circuits)), Programming (Computers), Oscilloscopes, Modules (Electronic), Transmission lines, Traveling-wave tubes, Printing, Pulse amplifiers, Instrumentation.

Contents: Serial addition with carry delay greater than pulse period; Feasibility of serial-parallel addition with delays greater than pulse period; Serial-parallel addition for lightning, using dual arithmetic; Counters using millimicrosecond logic modules; Logical design and programming techniques for time lag compensation; Biphase logic; Biphase logic and majority/minority gates; Logic gates with natural binary output; The expected error-free interval of operation of a computer is limited by thermal noise voltage; Transmission lines for pulse storage; Pulse response of coupling networks; Magnetic heads for high density recording; A note on high speed printing devices; Fast rise time plug-in unit for Tektronix oscilloscopes; D-C pulse amplifier using traveling wave tube; Pulse indicator; Fast random number generator.

31. Ships and Marine Equipment

PB-166 100 Div. 31, 33
OTS Prices: HC $3.00/MF $0.75

Maritime Administration, Washington, D. C.
RESEARCH AND DEVELOPMENT PROJECT REPORTS,
1 Nov 63, 89p
Unclassified report

Descriptors: (*Ships, Scientific research), (*Reports, Ships), Merchant vessels, National defense, Transportation, Shipping (Marine), Simulation, Mathematical models, Economics, Construction, Nuclear propulsion, Hydrofoils, Cargo ships, Maintenance, Operation, Labor, Management engineering, Engines and motors, Automation.

Topics include: routes services and studies; ship construction; mechanization and automation; nuclear propulsion; hydrofoils; surface effect ships; cargo handling and terminals; evaluation, inspection and maintenance; ship operation; labor- management; supporting research.

Torpedo noise, Cavitation noise, Underwater sound, Underwater equipment, Electronic equipment, Wiring diagrams, Naval equipment, Ordnance.

Part I of the report is concerned with torpedo self noise and its influence on control systems. Part II is divided into four main parts. The first, which is essentially introductory, covers a review of terminology in underwater sound, the nature of the problem of echo-ranging torpedo control and a general description of the major components involved in all echo-ranging control systems. The second and third cover, respectively, the systems developed for antisubmarine and anti-surface-ship service with a separate chapter devoted to each system. The fourth division contains an attempt at evaluation of the work which has been done up to the time of preparation of this report. In discussing each of the systems a general description is first given with a block diagram in order to indicate the general principles utilized in the device. This is followed, in all cases where the information is available, by a detailed discussion of the major components of the system with individual circuit diagrams of each functional component. This report is confined chiefly to the descriptions of the electronic gear which is used in the echo-ranging torpedoes since the application has so far been almost entirely to existing torpedoes which have been adequately described elsewhere. Only those physical characteristics which determine the behavior of a torpedo under echo-ranging control are noted.

23. Personnel and Training

PB-166 218 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
A NOTE ON FACTORS RELATED TO GROUP STATUS.
Rept. no. 3,
by Paul D. Nelson. 26 Jul 57, 10p
Proj. NM16 01 11, Task 4

Unclassified report

Descriptors: (*Group dynamics, Factor analysis), (*Military personnel, Group dynamics), Social communication, Social psychology, Sociometrics, Psychometrics, Correlation techniques.

An attempt was made to locate factors which might be related to satisfaction with one's own group and preference for another group within a military setting. When the members of a group are high in morale and talk frequently with other people, the tendency is for satisfaction with one's own group to exist. When members of a group are low in morale and talk with other people frequently, the tendency is for such members to express preference for another group. The characteristics of the members of the group for which such preference is expressed are the following: high morale, frequent communication with other people, and high satisfaction with their own group. (Author)

25. Physics

PB-166 093 Div. 25
OTS Prices: HC $3.00/MF $0.75

Allison Div., General Motors Corp., Indianapolis, Ind.
DIFFUSION OF POTASSIUM IN A LIQUID METAL CELL.
Engineering Dept. rept.,
by R. B. Wright. 21 Jan 64, 75p EDR-3814

Unclassified report

Descriptors: (*Potassium, Diffusion), (*Electrolytic cells, Potassium), Mercury, Electrodes, Equations, Mathematics, Mathematical models, Boundary layer.

The report presents the results of a study of potassium diffusion in the electrodes of a liquid metal cell (LMC) and its effect on cell performance. (Author)

PB-166 173 Div. 25
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
FLEXURAL VIBRATIONS OF ELASTIC SANDWICH PLATES.
Technical rept. no. 35,
by R. D. Mindlin. Aug 59, 12p CU-46-59-ONR-266(09)CE
Contract Nonr266 09, Proj. NR064 388
AD 225 856

Unclassified report

Descriptors: (*Sandwich construction, Vibrations), Elasticity, Equations, Deformation, Stresses, Thickness, Isotropism, Anisotropy.

28. Psychology and Human Engineering

PB-160 097 Div. 28, 1, 16
OTS Prices: HC $2.00/MF $0.50

Naval Medical Research Inst., Bethesda, Md.
A NOISE-LEVEL SURVEY OF FLIGHT OPERATIONS ABOARD THE USS CORAL SEA (CVB-43).
Research rept., vol. 10, p. 355-386,
by David E. Goldman. 30 Jun 52, 34p
Proj. NM004 005 03 06

Unclassified report

Descriptors: (*Airplane noise, Aircraft carriers), (*Auditory perception, Aviation personnel), (*Tolerances (Physiology), Jet engine noise), Deafness, Human engineering, After burners, Hearing, Noise.

A survey of noise levels associated with aircraft operations and of auditory acuity of ship's personnel was carried out during a recent refresher training cruise aboard the USS CORAL SEA (CVB-43). The data obtained, while neither complete nor of high precision, definitely indicate that the exposure of flight deck crew personnel to existing noise conditions is very close to probable tolerance limits. Peak noise levels of 130 to 135 db occur regularly during operation of F4U-4, AD-4 and F2H-2 airplanes. Mild chronic deafness is not uncommon although it may exist only for the duration of the shipboard duty. These hearing defects also affect voice communication and contribute to irritation and fatigue. The impending use of jet engines equipped with afterburners is expected to raise the peak noise levels by up to 8 db with current engines. Future, more powerful engines may be even noisier. This will increase the degree and duration of the hearing losses, the annoyance and the interference with communication. Non-auditory, mechanical effects on the body may also result. (Author)

tion, Models (Simulations), Computers, Programming languages, Feedback, Theory, Classification.

This paper summarizes experimental work applying clump theory to the problem of defining word associations in a context where documents are described by key terms, and of implementing a retrieval process within an associative network produced by keyterm clumps. Experimentation is largely confined to work with GR-clumps.

PB-166 123 Div. 32
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
SOME CLUMPING EXPERIMENTS FOR INFORMATION RETRIEVAL,
by A. G. Dale and N. Dale. Feb 64, 15p LRC-64-WPI1
Grant NSF GU483

Unclassified report

Descriptors: (*Information retrieval, Word association), (*Subject indexing, Information retrieval), Documentation, Computers, Programming languages, Classification, Theory.

This paper summarizes experimental work applying clump theory to the problem of defining word associations useful for document retrieval purposes in a context where documents are described by key terms and the retrieval request is specified by some subset of key terms. Clump theory is concerned with the consequences of alternative definitions of connection and clump for the purpose of establishing a reliable basis for automatic classification. Experimentation has been largely confined to work with GR-clumps.

PB-166 124 Div. 32
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
HARDWARE FOR MECHANICAL TRANSLATION: RELATION BETWEEN HARDWARE AND LINGUISTICS,
by E. D. Pendergraft. Mar 64, 21p LRC-64-WA4
Grant NSF GN208

Unclassified report

Descriptors: (*Machine translation, Language), (*Language, Theory), Computers.

Various types of translation theories and their interrelations are discussed. The use of computers to coordinate the work of applying general theories to particular languages is commented on. Finally, it is shown that the computational requirements of basic linguistic research should be considered in specifying mechanical translation hardware.

PB-166 143 Div. 32
OTS Prices: HC $1.00/MF $0.50

Institute for Scientific Information, Philadelphia, Pa.
CITATION INDEXES FOR SCIENCE. A NEW DIMENSION IN DOCUMENTATION THROUGH ASSOCIATION OF IDEAS,
by Eugene Garfield. 1955, 4p

Unclassified report

Pub. in Science 1955, 15 Jul, v. 122, no. 3159, p. 108-111.

Descriptors: (*Indexes, Documentation), (*Bibliographies, Reports), Subject indexing, Scientific research, Reasoning, Information retrieval.

A bibliographic system is proposed for science literature that can eliminate the uncritical citation of fraudulent, incomplete, or obsolete data by making it possible for the conscientious scholar to be aware of criticisms of earlier papers. The paper considers the possible utility of a citation index that offers a new approach to subject control of the literature of science. (Author)

PB-166 147 Div. 32
OTS Prices: HC $1.00/MF $0.50

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
A FLEXIBLE APPROACH TO INFORMATION RETRIEVAL,
by Jane Olmer. 1962, 5p

Unclassified report

Pub. in Technical Papers, Quarterly Review, 1962, Apr-Jun, p. 67-75.

Descriptors: (*Information retrieval, Data processing systems), Subject indexing, Computers, Errors, Data storage systems, Libraries, Reports, Tapes.

Progress is reported on programs now in use on the IBM 1401. It is shown that the inherently adaptable approach lends itself to a variety of applications. Rather sophisticated logical searches are being made on a scientific reports library file. (Author)

PB-166 148 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Ceskoslovenska Akademia Ved. Matematicky Ustav, Prague.
FORMAL STRUCTURE OF ALGOL AND SIMPLIFICATION OF ITS DESCRIPTION,
by Karel Culik. 1961, 8p

Unclassified report

Descriptors: (*Programming languages, Analysis), (*Programming (Computers), Programming languages), Computers, Mathematics.

PB-166 153 Div. 32
OTS Prices: HC $1.00/MF $0.50

RCA Defense Electronic Products, Princeton, N. J.
A MULTI-LEVEL FILE STRUCTURE FOR INFORMATION PROCESSING,
by L. Miller, J. Minker, W. G. Reed, and W. E. Shindle. 1961, 8p

Unclassified report

Report of Proj. ACSI-MATIC.

Descriptors: (*Data processing systems, Indexes), (*Programming (Computers), Digital computers), Information retrieval, Computer logic, Vocabulary.

The main objectives of the paper are to present a multilevel file structure for natural or textual language, and a computer algorithm which logically associates elements of the presented file structure. These objectives are met by showing how the formalized data is mapped into a vocabulary that is amenable to automatic computation. This vocabulary consists of a set of indices which retain the syntactual association of the inputs. These sets of indices constitute a file organization which employs an associative list-type structure. Newell, Simon and Shaw in their Information Processing Language.1 The problems of natural language input and how they are surmounted are described. The detailed multi-level file structure can be used with systems whose input includes textual language that may be

PB-166 222 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
RESEARCH IN RESISTANCE AND PROPULSION. PART I: A PROGRAM FOR LONG-RANGE RESEARCH ON SHIP RESISTANCE AND PROPULSION,
by F. C. Michelsen. Apr 64, 84p ORA-05589-1-F
Contract MA2564, T.O.3

Unclassified report

Descriptors: (*Marine propulsion, Scientific research), (*Ship hulls, Hydrodynamics), Integrals, Differential equations, Boundary layer, Fluid flow, Hydrodynamics.

The primary objective of the report is to outline a five-year program of research in the field of ship resistance and propulsion, with emphasis on developments of importance to U. S. merchant shipping. A second objective is to suggest what additional facilities should be planned for if the University conducted research in these fields is to become of importance on a long range basis.

32. Miscellaneous Arts and Sciences

AD-442 483 Div. 32, 12, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INTRODUCTION TO SPACE TRAVEL [AND] THIN ELASTIC PLATES: BOOK REVIEWS,
by Hsüeh-sen Ch'ien and Fu-fang Chang. 2 Jun 64, 6p
FTD TT64 250; TT 64 71194

Unclassified report

Edited trans. of Li Hsüeh Hsüeh Pao (Chinese People's Republic) 1963, v. 6, no. 3, back cover.

Descriptors: (*Reviews, Scientific research), (*Space-flight, Reviews), (*Loading (Mechanics), Reviews), Rockets, Spacecraft, Trajectories, Guided missiles, Control systems, Communication systems, Shielding, Atmosphere entry, Tensile properties, Compressive properties, Elasticity, Anisotropy, China.

PB-163 751 Div. 32
OTS Prices: HC $4.00/MF $1.00

Ohio State Univ., Columbus. Research Foundation.
BIBLIOGRAPHY AND GLOSSARY FOR CHINESE GRAMMAR.
Rept. no. 5,
by W. S-Y. Wang and Lillian Liu. 22 Mar 63, 141p
OSURF-1483-3, POLA-5
Grant NSF G25055

Unclassified report

Rept. on Linguistic Analysis.

Descriptors: (*Language, China), (*Bibliographies, Language), Dictionaries, Vocabulary, Analysis.

PB-163 964 Div. 32
OTS Prices: HC $2.00/MF $0.50

Itek Corp., Waltham, Mass.
DISCUSSION OF MAJOR FEATURES OF A RESTRICTED LOGISTIC GRAMMAR FOR TOPIC REPRESENTATION,
by T. M. Williams, R. F. Barnes, and J. W. Kuipers.
Feb 62, 31p II-5206-26
Grants NSF G3239, NSF C88

Unclassified report

Descriptors: (*Information retrieval, Data processing systems), (*Subject indexing, Information retrieval), Indexes, Data storage systems, Language.

PB-164 184 Div. 32, 30
OTS Prices: HC $6.00/MF $1.25

Computation Lab., Harvard Univ., Cambridge, Mass.
INFORMATION STORAGE AND RETRIEVAL.
Final rept.
by Paul Switzer, Dean S. MacLaughlin, Franklin L. Baker, Gerard Salton, and Edward H. Sussenguth, Jr.
1 Aug 63, 231p ISR-4
Contract AF19 604 8509, Projs. 5632, 5633
AFCRL 63 366

Unclassified report

See also AD-408 934

Descriptors: (*Information retrieval, Data processing systems), (*Data storage systems, Subject indexing), Computer logic, Word association, Topology, Bibliographies, Optimization.

Contents: Vector images in document retrieval, by Paul Switzer; A method of maintaining optimality in binary search trees, by Dean S. MacLaughlin; Some storage techniques for use with disk files, by Franklin T. Baker; Some experiments in the generation of word and document associations, by Gerard Salton; Automatic structure-matching procedures and some typical retrieval applications, by Gerard Salton and Edward H. Sussenguth, Jr.

PB-166 088 Div. 32
OTS Prices: HC $5.00/MF $1.00

Herner and Co., Washington, D. C.
CHARACTERISTICS OF PROFESSIONAL SCIENTIFIC JOURNALS, 1962. REPORT OF A SURVEY OF SELECTED SCIENTIFIC JOURNALS,
by David T. H. Campbell and Jane Edmisten.
30 Apr 64, 157p
Grant NSF C325

Unclassified report

Descriptors: (*Periodicals, Analysis), Scientific research, Reports, Documentation, Distribution, Costs, Printing, Abstracting.

Contents: The survey: purpose and technique, Age of journals, Frequency of issuance, Circulation, Indicators of the amount of research published, Subscriber costs, Time required from receipt to publication of an article, Compensation of editors and time spent on the journals, Copyright, Page charges, Abstracts and indexes, Printing techniques, Source of income, Publication costs, Bibliography.

PB-166 121 Div. 32
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
CLUMPING TECHNIQUES AND ASSOCIATIVE RETRIEVAL,
by A. G. Dale and N. Dale. Mar 64, 22p
Grant NSF GU483

Unclassified report

Descriptors: (*Information retrieval, Word association), (*Subject indexing, Information retrieval), Documenta-

manageable model of a library (together with search questions) constituted the object of the investigation; the effectiveness with which responsive information could be recovered was measured. The small scale of the model permitted direct examination of the entire collection as a basis for establishing practical measures of relevance or responsiveness to questions. In terms of these measures, the effectiveness of all information search techniques tested on the model was found to be rather low. Text search by computer was, however, significantly better than a conventional nonmechanized subject-index method.

PB-166 201 Div. 32
OTS Prices: HC $4.00/MF $0.75

Ohio State Univ., Columbus. Research Foundation.
FOUR-SYLLABLE EXPRESSIONS IN CHINESE. A FRAGMENT OF MANDARIN GRAMMAR: BA AND BEI. CHINESE POTENTIAL VERB FORM. DESENTENTIAL COMPLEMENT VERBS IN ENGLISH.
Rept. no. 7,
by Eugene Ching, Sandra S. Annear, Lillian Liu, Andre T. Tsai, and Charles J. Fillmore. Apr 64, 112p
OSURF-1685-1, POLA-7
Grant NSF GN174
Unclassified report

Project on Linguistic Analysis.

Descriptors: (*Machine translation, Language), (*Language, Analysis), Reports, China, Vocabulary.

The general objective of Project POLA (Project of Linguistic Analysis) is to construct linguistic descriptions of English and Chinese which exhibit formally the grammatical and semantic regularities of the two languages. POLA report No. 7 contains the following articles: FOUR-SYLLABLE EXPRESSIONS IN CHINESE; A FRAGMENT OF MANDARIN GRAMMAR (BA AND BEI); CHINESE POTENTIAL VERB FORM; and, DESENTENTIAL COMPLEMENT VERBS IN ENGLISH.

PB-166 202 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Rutgers Univ., New Brunswick, N. J. Graduate School of Library Service.
INVESTIGATION OF SYSTEMS FOR THE INTELLECTUAL ORGANIZATION OF INFORMATION,
by Susan Artandi. Jun 64, 44p
Grant NSF GN99
Unclassified report

Descriptors: (*Information retrieval, Indexes), (*Indexes, Information retrieval), Libraries, Documentation, Subject indexing, Computers, Input-output devices, Data storage systems, Language, Abstracting, Analysis.

The objective of the investigation is to bring together data on systems for the intellectual organization of information. Systems included in the study are described in terms of their distinctive characteristics, advantages, disadvantages, weaknesses, and limitations. It is assumed that a set of descriptive criteria applicable to information organization systems in general can be created and that sufficiently uniform descriptions can serve as a basis for comparative studies. (Author)

PB-166 210 Div. 32
OTS Prices: HC $7.00/MF $1.75

Computation Lab., Harvard Univ., Cambridge, Mass.
INFORMATION STORAGE AND RETRIEVAL,
by Gerard Salton, Michael Lesk, Claudine Harris, Mark Cane, and George Shapiro. June 64, 356p
ISR-7
Unclassified report

Report to the National Science Foundation.

Descriptors: (*Information retrieval, Data processing systems), (*Data storage systems, Dictionaries), Input-output devices, Programming (Computers), Programming languages, Correlation techniques, Statistical processes, Topology, Mathematical analysis, Matrix algebra.

Contents: The SMART system -- an introduction, by G. Salton; The SMART system -- general systems features, by M. Lesk; Dictionary and hierarchy construction, by C. Harris; Dictionary lookup and updating procedures, by M. Cane; Processing of the concept hierarchy, by G. Shapiro; Syntax and criterion procedures, by A. Lemmon; The sentence matching program -- GRAPH, by E. H. Sussenguth, Jr.; Setup and updating of the criterion tree file, by T. Evslin and T. Lewis; Statistical phrase processing, by M. Lesk and T. Evslin; Procedures for statistical processing and request alteration, by M. Lesk; Housekeeping routines, by M. Lesk and T. Evslin; Possible time-sharing organization for a SMART retrieval system, by J. J. Rocchio; A note on measures of similarity, by R. A. LeSchack; The determination of clusters by matrix anyalysis, by R. A. LeSchack.

structured or formalized into an 'attribute-attribute value' format, whose accuracy and/or reliability is questionable, and which is received in disjointed elements that have to be synthesized into meaningful associations. (Author)

PB-166 161 Div. 32
OTS Prices: HC $1.00/MF $0.50

Wales Univ., Cardiff.
STANDARDS OF ENGLISH IN SCIENCE AND TECHNOLOGY,
by A. J. Kirkman. 1962, 6p
Unclassified report

Pub. in Nature, 1962, 1 Dec, v. 196, no. 4857, p. 807-809.

Descriptors: (*Language, Standards), Errors, Scientific research, Reports.

PB-166 177 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION--1: SURVEY AND CRITIQUE.
Research memo.,
by H. P. Edmundson, K. E. Harper, and D. G. Hays.
25 Feb 58, 30p RM-2063
AD 150 672
Unclassified report

See also PB-166 176.

Descriptors: (*Machine translation, Language), (*Digital computers, Machine translation), Digital computers, Vocabulary, Computer storage devices, Data storage systems, Input-output devices, Character recognition, Computer logic, Control sequences, Operation, Dictionaries, Programming (Computers), Coding.

This paper contains a review of progress in research and development on the application of high-speed digital computers to language translation (e.g., Russian to English). It attempts to answer the following three questions: How can machine translation be accomplished. What are the principal achievements thus far. What more is required. (Author)

PB-166 178 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AUTOMATIC LANGUAGE-DATA PROCESSING IN SOCIOLOGY,
by David G. Hays. 29 Dec 59, 32p P-1866
Unclassified report

Descriptors: (*Sociology, Data processing systems), (*Machine translation, Language), (*Social communication, Machine translation), (*Language, Data processing systems), Digital computers, Vocabulary, Programming (Computers), Computer storage devices, Computer logic, Input-output devices, Control sequences, Dictionaries, Verbal behavior.

The use of computers in analysis of mass communications, interaction transcripts, and other sociological data couched in natural language is possible. A method of grammatic analysis is described, and techniques for automatic content analysis and interaction process analysis are sketched. The need for research on the relations between linguistic and social variables is emphasized. (Author)

PB-166 179 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION--6: MANUAL FOR CODING RUSSIAN INFLECTIONAL GRAMMAR.
Research memo.,
by K. E. Harper and D. G. Hays. 3 Mar 58, 34p
RM-2066
AD 150 685
Unclassified report

See also PB-166 177.

Descriptors: (*Machine translation, Language), (*Language, USSR), Coding, Vocabulary, Dictionaries, Programming (Computers), Data processing systems, Digital computers.

This document is one of a series on technical aspects of the linguistic analysis of Russian text. It describes a basic classification of Russian forms according to their inflections, or spelling changes. Appendices include a handbook for coding Russian grammar and a codebook for Russian grammar.

PB-166 180 Div. 32, 30
OTS Prices: HC $4.00/MF $0.75

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION--6: MANUAL FOR CODING RUSSIAN GRAMMAR.
Research memo.,
by K. E. Harper, D. G. Hays, and D. V. Mohr.
3 Mar 58, rev. 29 Dec 60, 104p RM-2066-1
Contract AF49 638 700
Unclassified report

See also PB-166 179.

Descriptors: (*Machine translation, Language), (*Language, USSR), Coding, Vocabulary, Dictionaries, Programming (Computers), Data processing systems, Digital computers, Punched cards, Data storage systems.

The present manual, one in a series on technical aspects of the linguistic analysis of Russian text, describes a basic classification of Russian forms according to their inflections, or spelling changes. It also describes a classification by syntactic properties, based on the possibilities for connection of the coded form with others in text. The appendix includes a codebook for Russian grammar. (Author)

PB-166 188 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
SEARCHING NATURAL LANGUAGE TEXT BY COMPUTER,
by Don R. Swanson. 21 Oct 60, 8p
Unclassified report

Pub. in Science 1960, v. 132, p. 1099-1104, 21 Oct.

Descriptors: (*Information retrieval, Computers), (*Indexes, Information retrieval), Automatic, Libraries, Classification, Subject indexing, Data storage systems, Theory.

A fundamental approach to automatic indexing and retrieval of library-stored information through investigating machine search of natural language text is described and the results of preliminary experimental studies based on that approach are presented. A limited and

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- Management and business aids
- Establishing a new business

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- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

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